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Amateur Radio

CQ

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OCTOBER 1988 $2.50

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CQ WW DX Contest 1987 CW Results

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All-Time Records

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The Kesters, an all-ham family, from Woodinville, California

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THE RADIO AMATEUR'S JOURNAL

KENWOOD

...pacesetter in Amateur Radio

NOW! 70 cm

All Mode Mobility!

TR-751A/851A

Compact all mode transceivers

It's the "New Sound" on the 2 meter band—Kenwood's TR-751A! Automatic mode selection, versatile scanning functions, illuminated multi-function LCD and status lights all contribute to the rig's ease-of-operation. All this and more in a compact package for VHF stations on-the-go!

- Automatic mode selection, plus LSB

144.0 144.1 144.5 145.8 146.0 148.0 MHz

CW	USB	FM	USB	FM

- Optional front panel-selectable 38-tone CTCSS encoder
- Frequency range 142-149 MHz (modifiable to cover 141-151 MHz)
- High performance receiver with GaAs FET front end
- VS-1 voice synthesizer option
- 25 watts high/5 watts adjustable low
- Programmable scanning—memory, band, or mode scan with "COM" channel and priority alert
- 10 memory channels for frequency, mode, CTCSS tone, offset. Two channels for odd splits.
- All mode squelch, noise blanker, and RIT
- Easy-to-read analog S & RF meter

- Dual digital VFOs
- Semi break-in CW with side tone
- MC-48 16-key DTMF hand microphone and microphone hook included
- Frequency lock, offset, reverse switches
- Digital Channel Link (DCL) option

Optional accessories:

- **CD-10** call sign display
- **PS-430, PS-30** DC power supplies
- **SW-100A/B** SWR/power meter
- **SW-200A/B** SWR/power meter
- **SWT-1** 2 m antenna tuner
- **SWT-2** 70 cm antenna tuner
- **TU-7** 38-tone CTCSS encoder
- **MU-1** modem unit for DCL system
- **VS-1** voice synthesizer
- **MB-10** extra mobile mount
- **SP-40, SP-50B** mobile speakers
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MC-60A, MC-80, MC-85** deluxe base station mics.
- **MC-43S** UP/DOWN mic.
- **MC-55** (8-pin) mobile mic.
- **MA-4000** dual band antenna with duplexer

Actual size front panel

TR-851A

70 cm SSB/CW/FM transceiver

The same winning features are yours on 70 cm with the TR-851A!

- Covers 430-439.999 MHz
- 25 W high power/5 W adjustable low
- MC-43S UP/DWN mic. and mic. hook included

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2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

Complete service manuals are available for all Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.
Specifications guaranteed for the 144-148 MHz Amateur band only.

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DX-cellence!

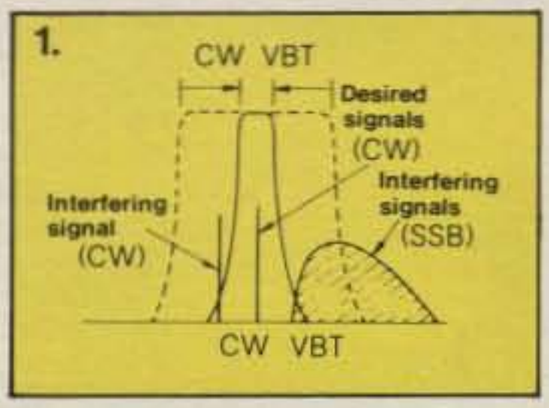
#1 Rated HF!

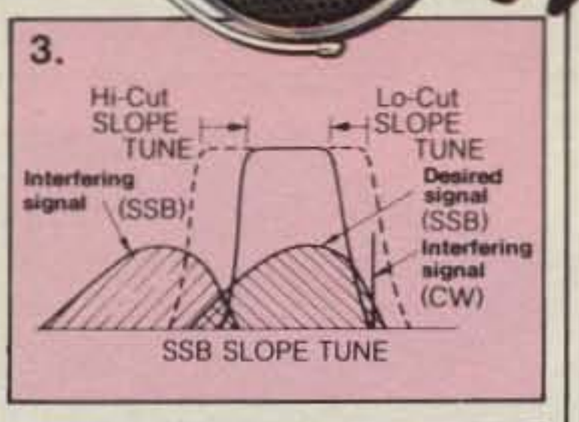
TS-940S

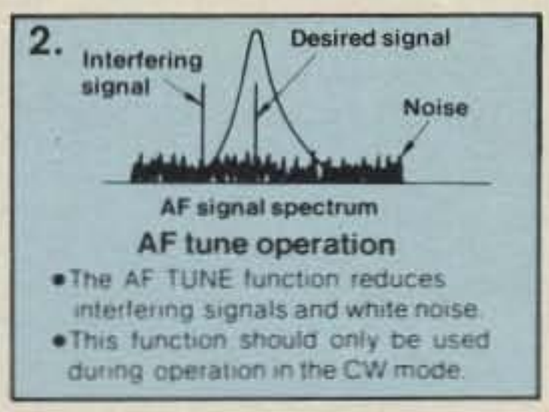
Competition class HF transceiver

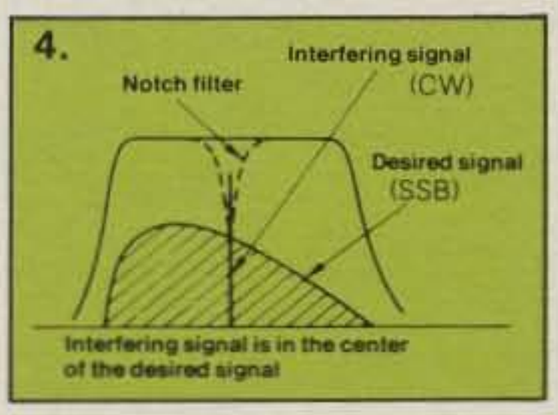
TS-940S—the standard of performance by which all other transceivers are judged. Pushing the state-of-the-art in HF transceiver design and construction, no one has been able to match the TS-940S in performance, value and reliability. The product reviews glow with superlatives, and the field-proven performance shows that the TS-940S is "The Number One Rated HF Transceiver!"

- **100% duty cycle transmitter.** Kenwood specifies transmit duty cycle ***time.*** The TS-940S is guaranteed to operate at full power output for periods ***exceeding one hour.*** (14.250 MHz, CW, 110 watts.) Perfect for RTTY, SSTV, and other long-duration modes.
- **First with a full one-year limited warranty.**
- **Extremely stable phase locked loop (PLL) VFO.** Reference frequency accuracy is measured in ***parts per million!***









1) CW Variable Bandwidth Tuning. Vary the passband width continuously in the CW, FSK, and AM modes, without affecting the center frequency. This effectively minimizes QRM from nearby SSB and CW signals.

2) AF Tune. Enabled with the push of a button, this CW interference fighter inserts a tunable, three pole active filter between the SSB/CW demodulator and the audio amplifier. During CW QSOs, this control can be used to reduce interfering signals and noise, and peaks audio frequency response for optimum CW performance.

3) SSB Slope Tuning. Operating in the LSB and USB modes, this front panel control allows independent, continuously variable adjustment of the high or low frequency slopes of the IF passband. The LCD sub display illustrates the filtering position.

4) IF Notch Filter. The tunable notch filter sharply attenuates interfering signals by as much as 40 dB. As shown here, the interfering signal is reduced, while the desired signal remains unaffected. The notch filter works in all modes except FM.

- **Complete all band, all mode transceiver with general coverage receiver.** Receiver covers 150 kHz-30 MHz. All modes built-in: AM, FM, CW, FSK, LSB, USB.
- **Superb, human engineered front panel layout for the DX-minded or contesting ham.** Large fluorescent tube main display with dimmer; direct keyboard input of frequency; flywheel type main tuning knob with optical encoder mechanism all combine to make the TS-940S a joy to operate.
- **One-touch frequency check (T-F SET) during split operations.**
- **Unique LCD sub display indicates VFO, graphic indication of VBT and SSB Slope tuning, and time.**
- **Simple one step mode changing with CW announcement.**
- **Other vital operating functions.** Selectable semi or full break-in CW (QSK), RIT/XIT, all mode squelch, RF attenuator, filter select switch, selectable AGC, CW variable pitch control, speech processor, and RF power output control, programmable band scan or 40 channel memory scan.

Optional accessories:
• AT-940 full range (160-10m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-43S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL-922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters • IF-232C/IF-10B computer interface.

Complete service manuals are available for all Kenwood transceivers and most accessories.
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NEW!

Affordable DX-ing!

TS-140S

HF transceiver with general coverage receiver.

Compact, easy-to-use, full of operating enhancements, and feature packed. These words describe the new TS-140S HF transceiver. Setting the pace once again, Kenwood introduces new innovations in the world of "look-alike" transceivers!

- **Covers all HF Amateur bands with 100 W output.** General coverage receiver tunes from 50 kHz to 35 MHz. *(Receiver specifications guaranteed from 500 kHz to 30 MHz.)* Modifiable for HF MARS operation. *(Permit required).*
- **All modes built-in.** LSB, USB, CW, FM and AM.
- **Superior receiver dynamic range** Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range.

- **New Feature! Programmable band marker.** Useful for staying within the limits of your ham license. For contesters, program in the suggested frequencies to prevent QRM to non-participants.
- **Famous Kenwood interference reducing circuits.** IF shift, dual noise blankers, RIT, RF attenuator, selectable AGC, and FM squelch.
- **M. CH/VFO CH sub-dial.** 10 kHz step tuning for quick QSY at VFO mode, and UP/DOWN memory channel for easy operation.
- **Selectable full (QSK) or semi break-in CW.**
- **31 memory channels.** Store frequency, mode and CW wide/narrow selection. Split frequencies may be stored in 10 channels for repeater operation.
- **RF power output control.**
- **AMTOR/PACKET compatible!**
- **Built-in VOX circuit.**
- **MC-43S UP/DOWN mic. included.**

Optional Accessories:

• **AT-130** compact antenna tuner • **AT-250** automatic antenna tuner • **HS-5/HS-6/HS-7** headphones • **IF-232C/IF-10C** computer interface • **MA-5/VP-1** HF mobile antenna (5 bands) • **MB-430** mobile bracket • **MC-43S** extra UP/DOWN hand mic. • **MC-55** (8-pin) goose neck mobile mic. • **MC-60A/MC-80/MC-85** desk mics. • **PG-2S** extra DC cable • **PS-430** power supply • **SP-40/SP-50B** mobile speakers • **SP-430** external speaker • **SW-100A/SW-200A/SW-2000** SWR/power meters • **TL-922A** 2 kW PEP linear amplifier (not for CW QSK) • **TU-8** CTCSS tone unit • **YG-455C-1** 500 Hz deluxe CW filter, **YK-455C-1** New 500 Hz CW filter.

TS-680S

All-mode multi-bander

- 6m (50-54 MHz) 10 W output plus all HF Amateur bands (100 W output).
- Extended 6m receiver frequency range 45 MHz to 60 MHz. Specs. guaranteed from 50 to 54 MHz.
- Same functions of the TS-140S except optional VOX (VOX-4 required for VOX operation).
- Preamplifier for 6 and 10 meter band.

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CQ The Radio Amateur's Journal

ON THE COVER: Here's the Kester family of Woodinville, CA, in their shack. Mom and Dad are Extra class licensees and the kids have their Novices. Kathy, KA7ZOW and Phil, WB7Q are the proud parents of Jill, KB7EXK and Jason, KB7EXL. Photo by Larry Mulvehill, WB2ZPI.

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Zero Bias

AN EDITORIAL

One line in a classic bawdy joke is "I'm from the government and I'm here to help you." In early August the government "helped us" to obtain 3 MHz in the 220 MHz band. It may be incidental that we already had them and were using them, but now indeed we do, by government decree, own them. Of course, the price for this edict was the bottom 2 MHz of the band. Perhaps we should just consider the 2 MHz as a consulting fee or a brokerage commission. The government sees the 2 MHz as a mere 2 percent of the amateur radio spectrum, while others see it as up to 15 percent of the spectrum. Whatever the actual percentage is really makes no difference, as a loss is still a loss. If you don't operate on 220 or never considered getting on 220 then much of the hullabaloo is probably meaningless to you. If you feel that it doesn't concern you or that it's someone else's problem, then you're wrong.

The amateurs who will have to vacate the bottom 2 MHz of 220 along with control and auxiliary stations are in some miniscule way analogous with American Indians or Japanese-Americans being relocated for some "common good." "Common good" is a political term which usually means that some group stands to make a lot of money under the guise of improving something—i.e., quality of life, security, or even technology. The medium is money and money is power. The amateur radio spectrum is a commodity —a fixed amount of something which has value by virtue of the fact there is no more. It is similar to real estate. There is a fixed amount of land available, and the land that more people want costs more than the land that fewer people want. Don't get me wrong. This is not a giant nefarious plot to take over amateur radio or to eliminate it. It is simply a fact of life that we are "sitting" on a valuable chunk of real estate that is becoming more and more attractive to developers. So if you see amateur radio only in terms of how you as an individual are affected and not in terms of how your whole neighborhood (i.e., 220) is affected, then it becomes simply a matter of chopping away a piece at a time.

Politics is not a dirty word, and politicians and bureaucrats are not necessarily evil people. It just happens that most of them don't have to live under the decisions they make in the name of "common good." So we lose 2 MHz this time and perhaps that's all it will be for the near future. But it can happen again on another band. To quote Larry Price, President of the ARRL, "We've lost a battle, but not the war."

I don't know about winning the war as a long-term objective, or if in effect the war is already over. Certainly there are a few more ceremonies to go through before everything is concluded. I'm still smiling over the logic that less is more. We now have 3 MHz instead of 5, and the 3 is firm, at least for the moment. Well, is there any lesson to be learned or benefit to be derived from this? Certainly. We learned about the power of the government and the power of UPS versus the power we thought we had. What about any benefits? Well, not very many at the moment, especially for those who have to pack and move to the "reservation" above 223. What about the future? Well, here lies the only backhanded edge that may filter down to us some day.

When we lost 11 meters years ago, some 40 million Americans became Southern truck drivers and took to the airways. Obviously, there wasn't enough gear for them all at the beginning, and in short order the big, tube-filled rigs were replaced by those small, neat solid-state rigs that eventually found their way into the amateur marketplace. Almost all of what we use today is the result of the technological changes brought about by the demand of the CB market. Let's face it: 40 million is a lot bigger than 400,000.

So, one would like to imagine that in this instance history will at least repeat itself. It is obvious that UPS will have to spend considerable money to develop a first-generation technology to satisfy their needs. We also know that in short order the next generations of technology will follow, making the first obsolete, at least for that market. Amateurs, as usual, will start picking up on that used market, and with some luck a new generation of amateur equipment will have emerged. In this way there may be some "common good" that will filter down to us without beating us on the head. Is it rationalizing? Yes, but it did happen the last time. Those of you willing to trade your exotic multiband, multi-controlled, multi-everything miniature transceiver back for a 6L6GT and 11 meters, please stand and say "Aye."

While the above may not be a great answer or even a suitable rationalization for what happened, the fact is that it did happen, and somewhere down the line there is the possibility that we might benefit from the loss. For the ever-present few who continue to cry that everything involving change in amateur radio is a plot to make money off of the amateur's back and that it should all be free or as close to free as possible, perhaps you should switch your allegiance to Parcel Post. Then again, Parcel Post is part of the same government that supports the FCC, so you're back where you started from—the great UPS, US Government conspiracy. Perhaps we could form a lobby to force the FCC to insist that all UPS drivers learn CW.

The world didn't end when we lost 11 meters or when we lost 5 meters, and what about the days of 200 meters, which are also gone? Somehow we'll survive the loss of those 2 MHz whether or not we derive any actual benefits. The government's 2 percent solution reminds me of the book about Sherlock Holmes also called the 2 percent solution. It was about the famous fictional detective, and the 2 percent referred to an addiction to a narcotic. You can rationalize almost anything if it's only 2 percent.

So if we go back to the bawdy joke I mentioned in the beginning, you can see why most people laugh at the statement "I'm from the government and I'm here to help you." To most people that is a signal to hide your valuables and attempt to protect yourself from something. We were "helped" to 3 MHz, and now we're just going to have to sit back and wait to see if the rabbit dies.

Contest Fever

It's contest time once again, and the BIG ONE is coming up. I hope you have enough log and summary sheets and that you took the time to study the rules. The *CQ* WW DX Contest season is here and just waiting for you. So check out last year's scores and the All-Time Records for the marks you have to beat. The rest of us can use this period to help out our country totals and pick up some rare ones that only show up for this event. It's also a good way to fill in those missing blanks while working for those achievement awards.

Everyone is a big gun in a contest, as everyone's call counts towards the final score. Try it out. You may be surprised to learn just how competitive you really are, and those rare ones will come back to you. Lest we forget, it's okay to have fun with amateur radio. Trust me.

73, Alan, K2EEK

6 Meter Version
NOW Available

Handheld DX with the DX Handy™

The idea of handheld DX seems far-fetched, but it's actually very simple. The DX Handy is a battery powered (six penlight AA drycells included) SSB/CW transceiver with two watts output. DX Handy can also use nicad rechargeable batteries, or be powered with 9 VDC.

Two variable crystal oscillators (VXOs), each with 50 KHz range, can be selected with a top panel switch. Crystals for 28.250 to 28.300 and 28.300 to 28.350 Mhz are included, and other crystal ranges for the 10 meter band are also available at a nominal cost.

CW operation can be by either the built-in push button or with an external key or keyer. External speaker and microphone jacks are also provided, and the telescoping antenna is included. The DX Handy also has a top panel S-meter/ output power meter and an effective noise blanker circuit. DX Handy is housed in an attractive gray metal case comparing in size to popular VHF FM handhelds.

Ten meters is coming back strong. With DX Handy all amateurs, novice to extra class, can enjoy the thrill of working handheld DX.

AEA
Advanced Electronic Applications
P.O. Box C2160
Lynnwood, WA 98036-0918
(206) 775-7373

Specifications

General
- Frequency Coverage: Any two 50 KHz segments in the 28.0–29.0 MHz Amateur Band (28.25–28.30 and 28.30–28.35 MHz supplied)
- Frequency Control: VXO provides 50 KHz of continuous tuning with a single crystal
- Frequency Stability: Within ±500 Hz from a cold start
- Antenna: 50 Ohms Unbalanced, BNC connector
- Power Requirement: 8.4–9.0 VDC
  (Included): 6-AA Dry Cells (1.5 volt/cell) = 9.0 VDC
  (Optional): 7-AA NiCads (1.2 Volt/cell) = 8.4 VDC
- Current Drain: Receiving - Approx. 70 mA
  Transmitting - Approx. 620 mA
- Dimensions: (W) 66mm × (H) 39mm × (D) 142mm
- Weight: 710 Grams (1 lb. 9 oz.) with batteries and antenna

Transmitter
- Output Power: 2 Watts at 9.0 VDC
- Emission modes: A3J (USB) and A1 (CW)
- Spurious Emissions: More than 40 dB down

Receiver
- Sensitivity: less than 0.5 uV for 15 dB S/N
- Intermediate Frequency: 11.2735 MHz

Controls and Indicators
- On/Off Volume control Top mounted Potentiometer
- Receiver Incremental Tuning (RIT): Top mounted Potentiometer with center off detent position
- Frequency: Top mounted 50 KHz VXO
- Frequency Range: Top mounted 2-position switch
- Noise Blanker: Top mounted On/Off switch
- S/RF meter: Top mounted S/RF meter
- Built in CW key: Top mounted momentary switch
- External Speaker output: Top mounted 1/16" phone jack
- External Microphone input: Top mounted 1/8" phone jack
- Antenna Connector: Top mounted Female BNC
- Transmit Indicator: Top mounted Transmit LED
- Push-To-Talk: Side mounted momentary switch
- External Power: Bottom mounted 2.1 mm coaxial
- External key input: Bottom mounted 1/8" phone jack
- Mode Selector Switch: Bottom mounted 2-position switch
- Charge/External Power: Bottom mounted 2-position switch selecting 12 VDC external power function

AEA Retail $379.95 **Amateur Net $319.95**

Specifications and prices subject to change without notice or obligation.

The PARAGON, Performance Plus...

All mode versatility and a transmitted signal you will be proud of. A receiver that has set new standards for sensitivity and quietness. Receives from 100 kHz to 29.999.99 MHz. Transmits on all bands from 1.8 MHz to 29.999.99 MHz with 100 watts output. SSB, CW, real FSK and optional FM. Standard equipment includes speech processor, noise blanker, dual VFOs, TX split, RX split and QSK with a changeover time of 30 ms or less. Five I-F filter positions with the 6 kHz AM filter and 2.4 kHz SSB filter, standard. Optional 1.8 kHz, 500 Hz and 250 Hz filters are selectable independent of mode. Two selectable tuning rates. Passband tuning, notch filter, audio bandpass filter, tone control, squelch and more!

Sixty-two programmable memories that store frequency, mode, filter selected, channel number and a 7 character alpha-numeric "tag" for entering channel I.D. Scan rate is selectable and as each memory is scanned all of the stored information is displayed (what a light show!). Alternately, the memories can be tuned with the main tuning knob.

Frequency selection is with the main tuning knob, direct keypad entry or up/down buttons that will shift in 100 kHz or one MHz increments or to the next ham band. DISPlay button selects 24 hour clock or date or tag. VOICE button causes a voice frequency announcement with optional synthesized voice board installed.

Rear panel controls are provided to adjust the VOX, cw monitor level and tone, and SSB sidetone monitor level. Switching is provided to control conventional linear amplifiers and of course, high speed switching for QSK linears, such as the Titan or the Hercules II. Other rear panel inputs and outputs for transverters, FSK (170 Hz shift), fixed level audio out, audio in, external speaker, aux dc jack and provision for the optional RS-232 control interface. An absolute delight for the all mode operator.

The Paragon is the result of a three year engineering effort. We are proud of the Paragon and we think it has set new standards of excellence in synthesized rigs. Check it out yourself. We think that you will share our pride in the Paragon.

The Classic CORSAIR II...

Unique in all the world, the CORSAIR II is the only ham transceiver available that uses a crystal mixed, permeability tuned oscillator. The ability of this scheme to reject strong adjacent signals and to dig out weak signals under the most adverse conditions is legendary. The 95 dB of dynamic range is all useable!

Frequency tuning is also unique. The main tuning is 18 kHz per turn. Dual range offset tuning can control transmit, receive or transceive. Selectivity is enhanced with a 16 pole crystal ladder filter and pass band tuning. The 50+ dB notch filter virtually eliminates carrier type interference. An eight pole audio filter is standard and the I-F filters are selectable independent of mode for superior operation on the digital modes.

The transmitter is well known for outstanding audio quality on SSB and QSK CW performance is simply beyond comparison. All ham bands are covered, 160 through 10 meters with WWV at 10 MHz. The front panel is a thoughtful and spacious arrangement with only the controls that you need.

If your number one priority is outstanding performance on the ham bands, and simplicity is still a virtue, you may be the kind of purist who deserves the classic CORSAIR II.

Add Satellite Communications To Your HF Station

Model 2510B

The Model 2510B, mode B, satellite station is a 70 cm, 10 watt SSB and CW transmitter with a super-sensitive, low noise, 2 meter to 29 MHz receive converter. The receive conversion idea takes advantage of the excellent selectivity and sensitivity that you already have in your HF station. Frequency tuning is with the PTO in the 2510B and the transmitter automatically tracks the receive frequency for "transceive" operation. "Split" operation is also provided. Two bands are included for full coverage of Oscar 10 and Oscar 13.

The Model 2410 is an all mode, broadband, 100 watt, 70 cm amplifier that adds 10 dB of gain to your up-link signal. Tx/Stby control can be hard-wired or automatic when the drive signal is present. Primary power is 12 to 14 Vdc at 20 amps.

Model 2410

TITAN: A Gallon And A Half Out! (5.68 Liters)

Titan

The TITAN has it all! 1500 watts output with ease, all legal bands 160 through 15 meters including MARS frequencies (10 meters after owner mod), lightning fast QSK for full break-in CW or the digital modes and a two speed blower for quiet operation on SSB. This awesome performance from a 17 lb desk top amplifier is made possible by a pair of Eimac® 3CX800A7 ceramic triodes and an external 45 lb power supply that is an absolute "horse."

The heart of the power supply is our own tape wound, four core Hypersil® transformer that weighs in at an impressive 41 lbs. The transformer is conservatively rated at 2.5 kva CCS. (9.5 kva IVS.) The power supply is housed in a separate utility enclosure and is nearly noiseless even at full power.

Front panel features include a ten element LED bargraph that displays peak power, a multi-meter selectable to read plate voltage, forward or reverse power and grid current. A matching meter is dedicated to display plate current. The TUNE and LOAD controls use 3:1 vernier drives which, in combination with a great RF deck design, make the TITAN a real "pussy cat" to operate.

The low drive requirement of the TITAN (65 watts for 1500 watts output, typical) makes life much nicer for your exciter too. This is especially comforting when operating keydown modes such as RTTY. Two product review articles have been published, see QST April 1986, CQ February 1986.

If you are ready to choose your dream amplifier the TITAN has everything but the highest price. Check it out!

THE TITAN IS BACKED BY A THREE YEAR LIMITED WARRANTY.

Hercules II No Tune HF Amplifier

The HERCULES II, Model 420, is an amplifier design that offers a combination of unique features that can only be achieved using modern solid state technology. Instant on, 12 - 14 Vdc operation, no-tune broadband final and compact size. General coverage operation from 1.8 to 22 MHz (to 29.999 MHz with authorized modification). Add to that lightning fast QSK cw, remote control, superb linearity and a low drive requirement. Outstanding!

The HERCULES II will interface nicely with virtually all transceivers. The front panel includes an analog multi-meter for collector current, voltage, forward power and SWR. A 10 element LED bar-graph display indicates peak output power. Band selection is made from the front panel switch or remotely controlled through a rear panel connector. Accessories are available for mobile remote control and automatic band tracking when using a Paragon. A front panel speaker is built-in.

The Model 9420 115/220 Vac power supply is in a separate utility enclosure and connects to the RF deck using a 6 foot power cable. It provides 80 amps to the amplifier plus 20 amps at 13.8 Vdc to power a 100 watt output exciter.

KW Antenna Tuner

The Model 229B adds a lot of versatility to your HF station antenna system. With this tuner you can load virtually any unbalanced (coax or single wire) antenna. With the accessory balun, antennas with balanced feeders can be used. Maximum legal power may be used from 1.6 to 30 MHz. The modified "L" network will tame an SWR of at least 10:1, any phase angle, without "false load" problems. Lighted multi-meter shows power in two ranges plus reflected power. A great way to operate all bands with something less than a world-class antenna farm.

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Announcing

International Winter Special Olympics - The Reno/Lake Tahoe Area Special Olympics will take place on April 1–8, 1989. The Truckee ARA has been working on the communications system, which is scheduled to be operational by the first snowfall. Equipment and support organizations and individuals are still sought. If you or your group would like to participate or contribute to the event, contact Jim Newell, WA7UJB, at 702-825-7808. For more information, contact Tim Melarkey, WA7MOF, 5849 Mt. Rose Hwy., Reno, NV 89511.

The following Special Events will take place during October:

W1GB, from Fall River, MA; Quinnipiac Council of Boy Scouts, Jamboree-on-the-Air; 2359Z Oct. 21 to 1800Z Oct. 23; phone General portion of 80–15 meters, Novice 10 meters, CW middle of 40 and 15 meter Novice bands. For special QSL send SASE to Skip Paquette, KA1EAJ, 121 West Dayton Hill Rd., Wallingford, CT 06492.

KE2T, from Webster, NY; Xerox ARC; 0000–2400Z Oct. 22; phone lower 25 kHz of General 80–10 meter bands and Novice portion of 10 meters, CW 50 kHz above the lower band edges. For certificate send QSL and business-size SASE to XARC, Building 337, Joseph C. Wilson Center for Technology, 800 Phillips Rd., Webster, NY 14580.

K2BSA, from Dallas/Fort Worth, TX; Jamboree-on-the-Air, Boy Scouts of America; 0001 local time Oct. 15 to 2400 local time Oct. 16; phone 3940, 7290, 14290, 21360, 28350; CW 3590, 14070, 21140, 28190; packet, RTTY, SSTV, ATV on usual frequencies, plus check the Novice frequencies. For certificate send SASE to Jamboree-on-the-Air Certificates, S221, 1325 Walnut Hill Lane, P.O. Box 152079, Irving, TX 75015-2079.

WB2JQR, from Grovers Mill, NJ; GE Astro Space Division ARC; 1400Z Oct. 30 to 0200Z Oct. 31; CW 3.535, 7.035, 7.135, 14.035, 21.135, 28.135 MHz; phone 3.950, 7.235, 14.285, 21.355, 28.400 MHz. For QSL and certificate, send QSL and 9 by 12 envelope for unfolded or legal-size envelope for folded to Alex Montare, KA2VLP, Astro Radio Club, MS 410-1B, GE Astro Space Division, P.O. Box 800, Princeton, NJ 08543-0800.

K4HOG, from Lexington, NC; Healing Springs Mtn. VHF Society; 1300–2100Z Oct. 29; phone 7245, 14245, 28320 kHz; CW 7030 kHz. For special QSL send SASE to Healing Springs Mtn. VHF Society, P.O. Box 41, Lexington, NC 27293-0041.

KB4PIW, from Chattanooga, TN; Chattanooga Choo-Choo Chapter of 10-10 International; 1400–2200Z Oct. 15–16; phone 28.485 MHz. For certificate send QSL and No. 10 SASE to Martie Perry, KB4PIW, Rt. 3, Box 272, Signal Mountain, TN 37377.

W4DW, from Mount Mitchell State Park, NC; Raleigh ARS; Oct. 15–16 (no times given); lower portions of the 80–15 General phone bands and 10 meter Novice segment. For QSL send your QSL and SASE to W4DW Special Event, Raleigh ARS, Box 17124, Raleigh, NC 27609.

K4-land, from Dalton, GA; Dalton ARC; Oct. 8–9 (no times given); phone 40 and 20 meters with 10 meters if conditions permit. For QSL send SASE to DARCI, P.O. Box 143, Dalton, GA 30722-0143.

W4YCZ, from Hampton, VA; Southern Peninsula AR Klub; 1400–2300Z Oct. 8–9; 80–10 meters near low end of General class band, CW in the Novice and General bands as time permits. Send SASE to SPARK, 172 W. Ocean Ave., Norfolk, VA 23503.

WM5Q, from Las Cruces, NM; Billy the Kid Chapter of 10-10 International; 1600–2300Z Oct. 1; phone and CW as well as packet on VHF, suggested frequency 28.365 MHz, but operation of other HF bands is planned. QSL to Billy the Kid Chapter of 10-10 International, P.O. Box 274, Fairacres, NM 88033.

W5ANR, from Poteau, OK; Fort Smith, Arkansas Area ARC; 1400–2300Z Oct. 8 and 1400–2200Z Oct. 9; lower 30 kHz of the General phone bands, 28.435 in Novice phone, and 145.01 on packet. For certificate send QSL and SASE to FSAARC–W5ANR, Box 32, Fort Smith, AR 72902-0032.

N5CAF, from Harlingen, TX; South Texas Amateur Repeater Society; 8 a.m. to 8 p.m. local time Oct. 7–8; phone 14260, 21360, 28460. For certificate QSL send QSL and SASE to Dr. David Woolweaver, K5RAV, 2210 S. 77 Sunshine Strip, Harlingen, TX 78550.

WB8ZVS, from Clarksburg, WV; Stonewall Jackson ARA; 1400–0100Z Oct. 9; phone lower portion of the General 20, 40, 75 meter bands; CW in 40 meter Novice band. For certificate send contact number, QSL, and SASE to J.R. Chiado, KA8ZQP, 289 Magnolia Ave., Clarksburg, WV 26301.

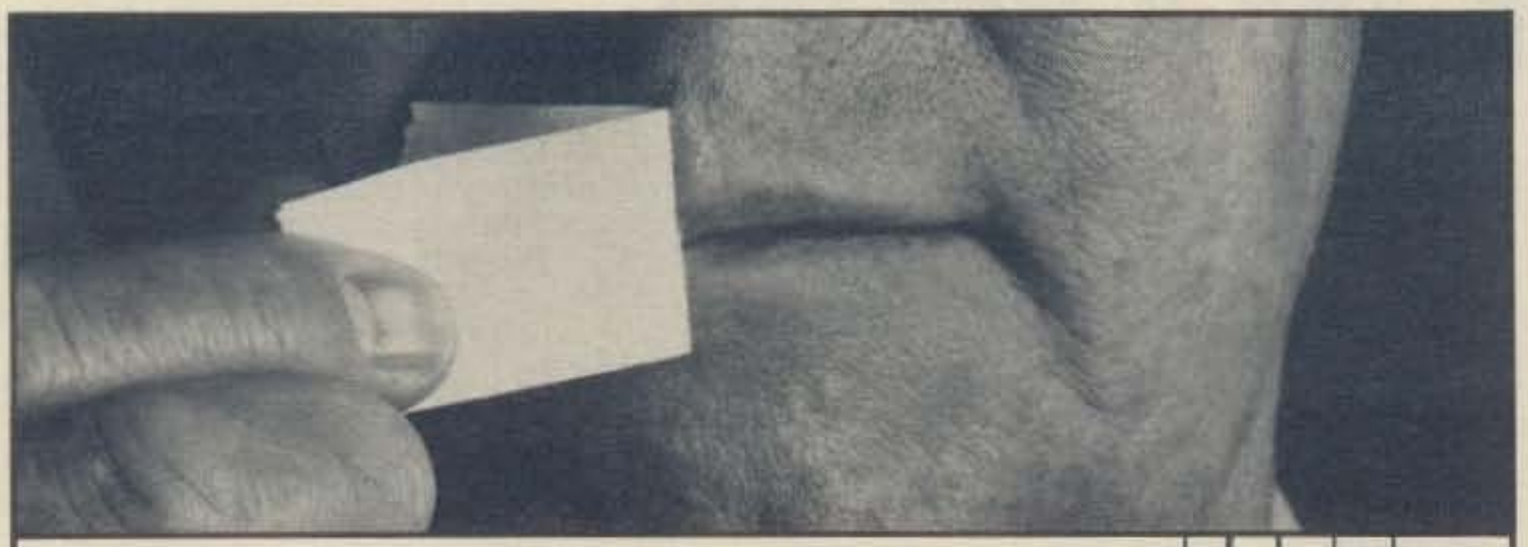
W8TO, from Columbus, OH; Columbus ARA; 1500–0300Z Oct. 8–9 and 1500–2400Z Oct. 9; phone 7.240, 14.340, 21.375, 28.500 MHz (all plus or minus 10 kHz). For information on QSLs, certificates, plaque available, contact Roger Dzwonczyk, WB2EIG, 283 East Longview Ave., Columbus, OH 43202.

NU8K, from Logan County, WV; Logan County ARC; 1600Z Oct. 1 to 0200Z Oct. 2; phone 25 kHz from the low end of the General phone bands as propagation allows. For certificate send QSL and legal-size SASE to Roy Elkins, NU8K, P.O. Box 202, Monaville, WV 25636.

N0DST, from Branson, MO; White River Valley ARS; 0700–1900 CST on Oct. 15; 10, 20, and 80 meters, packet also available. For QSL send your QSL and 8½ × 11 SASE to WRVARS, P.O. Box 961, Pt. Lookout, MO 65726.

N0AUY, from Moberly, MO; Tri-County ARC; 1600Z Oct. 15 to 0200Z Oct. 16; lower 25 kHz of 80–15 meters and Novice part of 10 meters. For certificate send business-size SASE to Tri-County ARC, P.O. Box 341, Moberly, MO 65270.

N200RH, from Reno, NV; Wide Area Data Group; Oct. 22–28 (plus multi-multi in CQ WW DX CW Contest); CW 28025, 21025, 14025, 7025, 3525; phone 28495, 21310, 14230, 7230, 3860. Send QSL and SASE to N200RH, P.O. Box 3132, Sparks, NV 89432.



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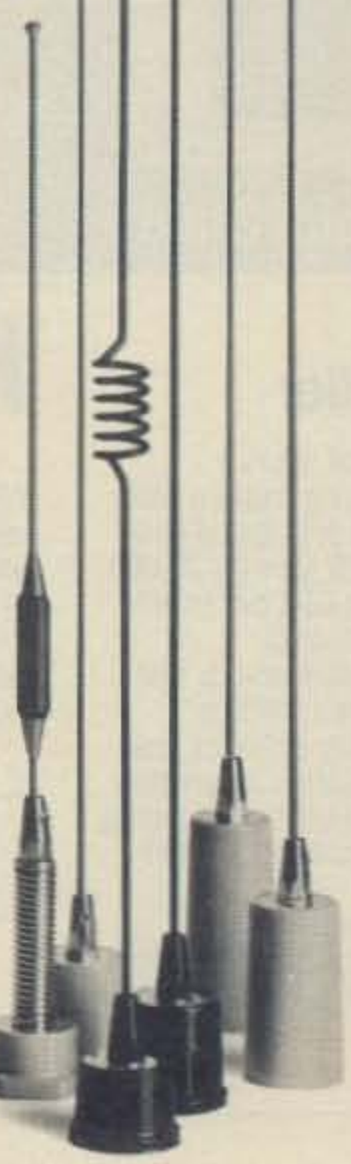

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ON4CLM, from Knokke, Belgium; Oct. 28 to Nov. 2 (no times given); phone 3.685, 7.045, 14.145, 21.245, 28.545, 144.250 MHz; CW 3.515, 7.012, 14.020, 21.020, 28.020, 144.020 MHz; and 145.475 FM. For QSLs or more info contact Radio station ON4CLM, P.O. Box 110, 8300 B-Knokke Heist, Belgium. (Limited quantities of 1983–87 awards are still available, as a "specimen," for collectors. Use above address for more info.)

The following hamfests, etc., are slated for October:

Oct. 1, **Tri-State ARA Hamfest and Computer Fair,** Huntington Civic Center, Huntington, WV. Contact Charley Shumacher, N8IKP, 304-523-5264, or P.O. Box 4120, Huntington, WV 25729.

Oct. 1–2, **ARRL Kansas Convention,** Red Coach Inn, Wichita, KS. Contact Vern Heinsohn, WA0ZWW, 950 Back Bay, Wichita, KS 67203.

Oct. 2, **ARRL Illinois State Convention and Rockford Hamfest 88/ Computer Fair,** National Guard Armory, Rockford, IL. Contact Roger Sawvell, KD9MQ, 815-282-1283, or send SASE to Rockord Hamfest, P.O. Box 10003, Rockford, IL 61131.

Oct. 2, **St. Peters ARC Swapfest,** McNair Park Day Care Cener, St. Charles, MO. Contact Allen Underdown, 314-723-4200.

Oct. 2, **Yonkers, NY Electronics Fair and Fleamarket,** Yonkers Muicipal Parking Garage, Yonkers, NY. Contact Yonkers ARC, 914-969-1053.

Oct. 2, **Southeast Iowa Hamfest,** West Liberty Fairgrounds, West Liberty, IA. Contact Ken Kucera, KA0Y, RR2 Box 52A, Rivrside, IA 52327 (319-648-5037). (Exams at 10 am.)

Oct. 2, **Lake County ARC Hamfest,** Hammond National Guard Armory, Hammond, IN. Contact Lucy Schendera, N9DTG, 812 E. 40th Place, Griffith, IN 46319, or call 219-923-4873.

Oct. 2, **Springfield Hamfest and Computer Expo,** Springfield, OH. Contact Springfield Independent Radio Assn., P.O. Box 523, Springfield, OH 45501 (SASE).

Oct. 2, **1988 Blossomland Blast,** Lake Michigan College, Benton Harbor, MI. Contact "Blast," P.O. Box 175, St. Joseph, MI 49085.

Oct. 7–8, **Central Georgia ARC Hamfest,** Warner Robins Recreation Center, Warner Robins, GA. Contact N4MXC, 112 Carol Dr., Cochran, GA 31014 (921-923-9236 after 6 pm).

Oct. 8–9, **DXPO 88,** Best Western Inn, Falls Church, VA. Contact Stuart Meyer, W2GHK/4ever, 2417 Newton Street, Vienna, VA 22180.

Oct. 9 (rain date Oct. 16), **Hall Of Science ARC Hamfest,** NY Hall of Science parking lot, Flushing Meadow Park, Queens, NY. Contact Steve Greenbaum, WB2KDG, 718-898-5599 or Arnie Schiffman, WB2YXB, 718-343-0172 (both evenings).

Oct. 9, **HamFair 88,** Lansing Civic Center's Exhibition Hall, Lansing, MI. Contact Rowena Elrod, KA8OBS, 111 Lancelot Place, Lansing, MI 48906 (517-482-9650).

Oct. 9, **Northwest Ohio ARC Hamfest,** Allen County Fairgrounds, Lima, OH. Contact WD8BND, P.O. Box 211, Lima, OH 45802 (SASE), or call 419-647-6513. (Handicapped accessible.)

Oct. 14–16, **Houston Com-vention,** Houston, TX. Contact Houston Com-vention, c/o Robert Craig, P.O. Box 61081, Houston, TX 77208-1081.

Oct. 15, **Radio Amateurs of Greater Syracuse Hamfest,** Art and Home Center, NY State Fairgrounds, Syracuse, NY. For more info call 315-469-0590.

Oct. 15–16, **Palm Beach County ARRL Hamfest,** South Florida Fairgrounds, West Palm Beach, FL. Contact Palm Beach Repeater Assn., P.O. Box 461, Lake Worth, FL 33460.

Oct. 16, **Chicago ARC W9CAF Old Timers Day and Reunion,** North Park Village, Chicago, IL. For more information, call 312-545-3622.

Oct. 16, **37th Annual Rock Hill Hamfest,** Joslyn Park, Rock Hill, SC. Contact Frank Bateman, N4HRP, P.O. Box 4141 CRS, Rock Hill, SC 29731.

Oct. 16, **Cumberland County Hamfest,** Carlisle Fairgrounds, Carlisle, PA. Contact C-CARS, P.O. Box 448, New Kingston, PA 17072 (SASE).

Oct. 23, **Kalamazoo Hamfest,** Kalamazoo Central High School, Kalamazoo, MI. Contact Gary Hazelton, KB8PL, 67332 32nd St., Lawton, MI 49065 (SASE).

Oct. 23, **London ARC Fleamarket,** Pot of Gold Bingo Palace, London, Ontario, Canada. Contact London ARC, P.O. Box 82, Station B, London, Ont. N6A 4V3, c/o Dave Noon, VE3IAE (519-453-2292).

Oct. 29, **Tri-City ARC Auction,** Gales Ferry Fire House, Gales Ferry, CT. Contact WA2RYV, 203-464-6555.

Oct. 29, **Hamfest Minnesota and Computer Expo,** Hennepin Technical Institute, Brooklyn Park Campus, Brooklyn Park, MN. Contact Hamfest Minnesota and Computer Expo, P.O. Box 5598, Hopkins, MN 55343, or call Mike Sigelman, K0BUD, 612-542-8450.

Oct. 29–30, **Hamfest Chattanooga Amateur Radio and Computer Convention,** South Hall of Chattanooga-Hamilton County Convention and Trade Center, Chattanooga, TN. Contact Hamfest Chattanooga, P.O. Box 3377, Chattanooga, TN 37404.

Oct. 29–30, **Texoma Hamarama 88,** Texoma State Lodge, Lake Texoma, Kingston, TX. Contact Texoma Hamarama Assn., P.O. Box 610892, DFW Airport, TX 75261, or call Dave Cox, NB5N, 918-250-2285.

Oct. 30, **Heart of Ohio Ham Fiesta,** Marion County Fairgrounds Coliseum, Marion, OH. Contact Ed Margraff, KD8OC, 1989 Weiss Ave., Marion, OH 43302 (614-382-2608).

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Entries must be as above, postmarked by November 30, 1988, one only per licensed amateur. Closest guess wins a new ***ALPHA 86.*** If the winner already owns an ***'86***, the prize will be a new ***ALPHA 87.***

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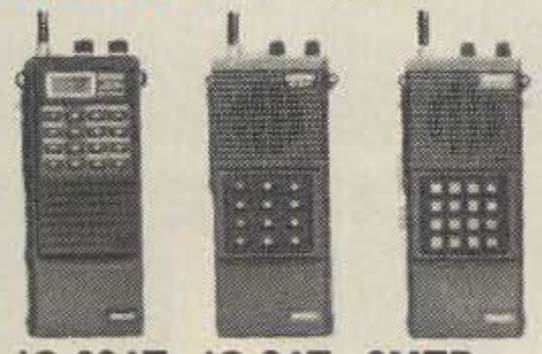

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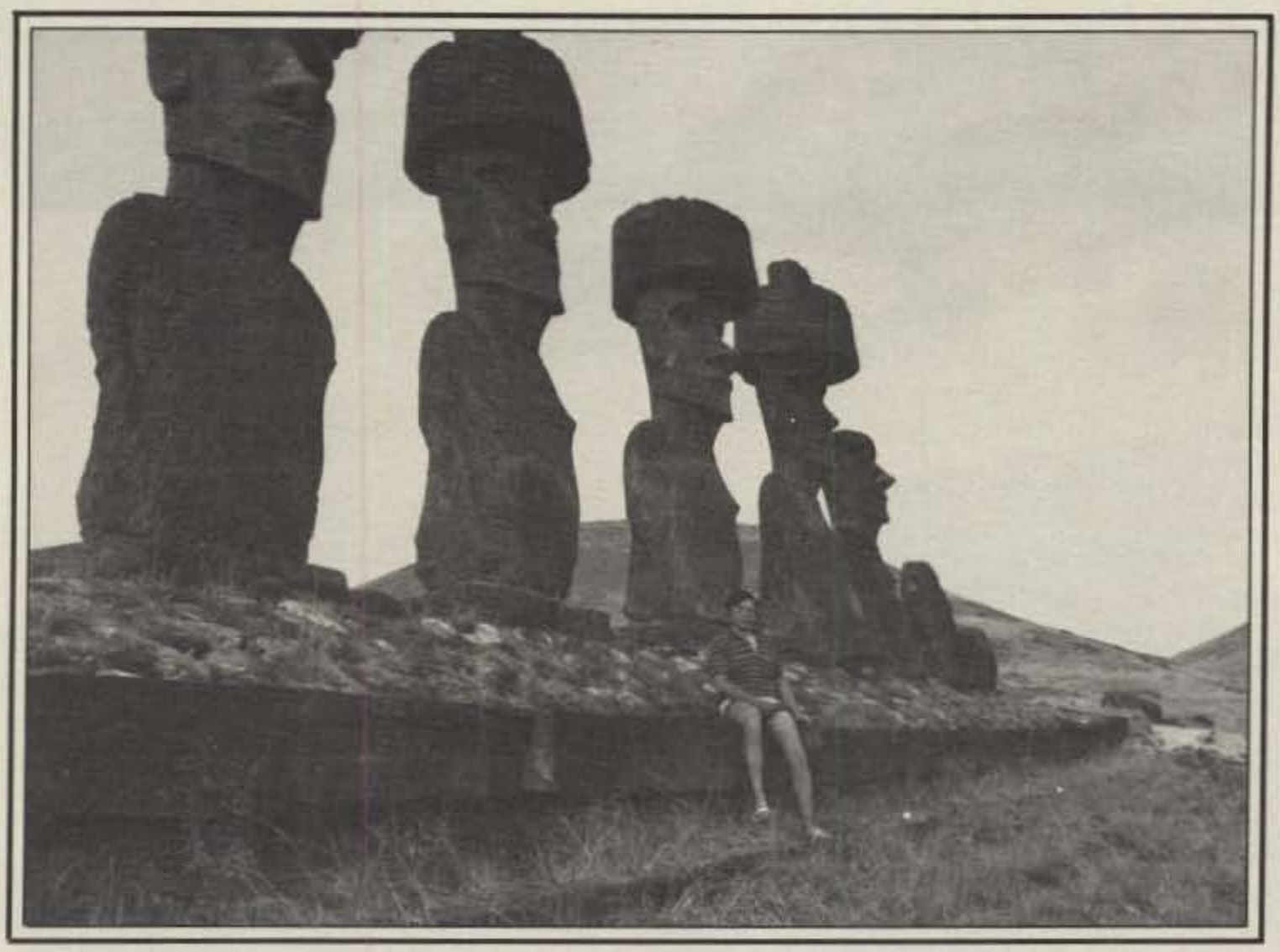

Next time you work Jaime, CE0ZIG, you can remember this photo.

Olli, OH0XX, checking the frequency at CR9BZ just before the test.

Carl handed out YK as OF6XY/4U to a lot of happy hams!

Results of the 1987 CQ World-Wide DX CW Contest

BY BOB COX*, K3EST/6, AND LARRY BROCKMAN**, N6AR/4

The name of the game in the *CQ* WW is fun and excitement. Working that rare country, running stations at fast rates, QRPing your way through the pileups, or operating on a multi-operator team, the contest has something for you. Last year's *CQ* CW test was certainly a harbinger of the new sunspot cycle. That weekend was the best CW weekend in recent memory.

All Band Results

The great conditions produced exceptional scores. Continental records fell in large numbers due to good high- and low-band conditions (even with a poor to average 28 MHz band). To challenge for the world cup the best place to be was northern South America. After all the dust settled, the top score in the world was FY5YE operated by Ville, OH2MM. Ville set a new world record of 8.2 million points. He was hotly contested by P40GD, operated by John, W2GD, and HD5X operated by KQ2M, Bob. In addition to complete concentration during the contest, these fine operators each made over 5,000 QSOs. The QSO leader was NP4A operated by N2NT. The top USA score was generated by K1EA, who set a new US record. In the number two slot was W1KM, who should be noted had a 100 QSO hour rate on 80 meters! The number one score in Europe, setting a new European record, was I4IND. Way up on beautiful Aaland Island, Lars, SM0GMG, put OH0BH into second place. As a matter of fact, single operator, all band continental records were set in Africa (9Q5NW), Asia (5B4TI), Europe (I4IND), North America (NP4A), and South America (FY5YE). Repeating his SSB QRP performance Danny, K7SS, journeyed up to VE7DX, where he won for the world in the QRP category. Not far behind in second place was YU3BC.

The two teams in the Team Contesting category made everyone happy by traveling to 10 different countries. After adding up the scores of the two teams, it was a near photo finish, with Team America just edging out Team Scandinavia. The two teams set three of the new continental records. Quite an effort!

Single Band Results

As has been the case for several years, the southern hemisphere led the way on 28 MHz. The top score goes to 4M7A (YV7QP) operating from Margarita Island, followed by Jim at PY5CA. Congratulations to KH2F, who managed to break the top six from Guam. As you can see from the top score listings, conditions still have not opened up for the northern hemisphere. In that part of the world, F6AUS and N4EJW led the way. The 21 MHz story was LU8DQ camouflaged as LO8WW. Jorge keyed his way to a new world record over 5H3BH (SM0AJU), who set a new African record. In the US, K5GO edged out W5VX, while in Europe 4N4A (YU4EJC) crossed the finish line before LZ1KDP (LZ1AX). The high scores on 14 MHz are found in the northern hemisphere, with EA8ID (DK3GI) the number one score setting a new African record and finishing ahead of CW8B. Carl, K3RV/4, placed number 1 in the US, while Tine, YT3AA, did his usual superb job as number 1 in Europe. Forty meters was fan-

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Memphis Amateur Electronics - Memphis, TN
Michigan Radio - Mt. Clemens, MI
Mission Consulting - Houston, TX
Missouri Radio Center - Kansas City, MO
N&G Electronics - Miami, FL
Omni Electronics - Laredo, TX
Quement Electronics - San Jose, CA
RF Enterprises - Merrifield, MN
R&L Electronics - Hamilton, OH
Reno Radio, Reno, NV
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—Art Skufca - KC8XA

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—Scott Thomas - N6LGB

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—Oscar Fick, Jr. - W1MBR

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—Myron A. Calhoun - WØPBV

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—Monino S. Duque - DU1BJD

"I hooked it up, and it works fine - thanks for a nice product."
—J. D. Wileman - KA5YJN

tastic with several entrants having over 120 countries in their logs. The low K and A indices allowed polar signals to be loud and persistent, a welcome change from the usual high absorption. The world winner for 7 MHz was YW1O (YV1DIG) with over 2,016 Qs in the log. Finishing second with 2,012 Qs was YU3ZV returning to the contest after several years absence. Both operators set new continental records. In the USA the battle on 7 MHz produced real fireworks. In the final analysis Jim, W6YA, edged out KM6B (N6AW) for the title. Dov, 4Z4DX, traveled over to ZC4DX and took away the world high 3.5 MHz score and in doing so set a new Asian record. He was trailed by the outstanding effort from UA2FGA, who set a new European record on his way to making over 1,900 Qs. The only single band record to fall in the USA was the winning score of W1FV on 3.5 MHz.

Top band continues to produce big scores and big activity. This year we counted over 90 countries in the logs received. Taking away the world title and setting a new Asian record was

CW TROPHY WINNERS AND DONORS

SINGLE OPERATOR, ALL BAND

WORLD
FY5YE (Opr. Ville Hiilesmaa, OH2MM)
Donor: W2AB Memorial (Albert Kahn, K4FW)

World QRP
VE7DX (Opr. Danny Eskenazi, K7SS)
Donor: Gene Walsh, N2AA

USA
Kenneth Wolff, K1EA
Donor: Frankford Radio Club

Canada
George Andrew McLellan, VE1ASJ
Donor: Canadian DX Association

Caribbean/Central America
NP4A (Opr. Andrew Blank, N2NT)
Donor: Peter Monroe, WB1DQC

Europe
Francesco Chiodini, I4IND
Donor: Edward Bissell, W3AU

Africa
9Q5NW (Opr. Richard Norton, N6AA)
Donor: Gordon Marshall, W6RR

Asia
5B4TI (Opr. Philip Goetz, N6ZZ)
Donor: Japan CQ Magazine

Japan
Akito Nagi, JA5DQH
Donor: Japan Crazy Contesters Club

Oceania
KC6CS (Opr. Satoshi Nakamura, JE1JKL)
Donor: Maui Amateur Radio Club

South America
P4ØGD (Opr. John Crovelli, W2GD)
Donor: YV5AAZ Memorial (Venezuela DX Club)

SINGLE OPERATOR, SINGLE BAND

World—28 MHz
4M7A (Opr. Neris Vicent Brancho, YV7QP)
Donor: Joel Chalmers, KG6DX

World—21 MHz
LO8WW (Opr. Jorge Bozzo, LU8DQ)
Donor: South Jersey DX Assn. (N2CW Memorial)

World—14 MHz
EA8ID (Opr. Roland Mensch, DK3GI)
Donor: North Jersey DX Assn. (K2HLB Memorial)

World—7 MHz
YW1O
(Opr. Paolo L. Stradio Roseano, YV1DIG)
Donor: Alex M. Kasevich, VP2MM

World—3.5 MHz
ZC4DX (Opr. Dov Gavish, 4Z4DX)
Donor: Fred Capossela, K6SSS

World—1.8 MHz
Algis Kregzde, UP2NK/UF
Donor: KP4ES Memorial (Chip Margelli, K7JA)

USA (14 MHz)
Carl Kratzer, K3RV/4
Donor: Northern Illinois DX Association

USA—7 MHz
James Mc Cook, W6YA
Donor: Jan Perkins, N6AW

Canada (14 MHz)
Brian Kelly, VO1QU
Donor: Canadian Amateur Radio Federation

Caribbean/Central America (14 MHz)
8P9EL (Opr. Dennis McAlpine, K2SX)
Donor: DX Club of Puerto Rico

Europe (7 MHz)
Drago Turin, YU3ZV
Donor: Southern New England DX Club

Australia—14 MHz
D. F. Kiesewetter, VK2APK
Donor: Jay Farr, W6FAY

Japan—21 MHz
JA1YWX
(Opr. Muneharu Yokoyama, JO1BMV)
Donor: DX Family Foundation

SPECIAL SINGLE OPERATOR COMBINED SSB/CW

World—All Band
Olli Rissanen, OHØXX (Opr. FY5YE/CR9BZ)
Total: 15,511,933
Donor: John Knight, W6YY

World—Single Band
James Hoffman, N5FA (Opr. PY5CA/ZZ5EG)
Total: 2,343,548
Donor: Yuri Blanarovich, VE3BMV

World—Most Contacts (5382)
NP4A (Opr. Andrew Blank, N2NT)
Donor: KV4AA Memorial (14270 kHz Group)

CLUB

USA (World)—SSB/CW
Frankford Radio Club: 131,509,320
Donor: CQ Magazine

DX—SSB/CW
Bavarian Contest Club: 39,145,235
Donor: No. Calif. Contest Club (N6AUV Memorial)

MULTI-OPERATOR SINGLE TRANSMITTER

World
EA8AGD (Opr. OH8LP, OH8NW, OH8PF, OH8SR)
Donor: Anthony Susen, W3AOH

USA
K1GQ (Opr. K1GQ, K1AR, K1JX, KC1F, AK1A, AA2Z)
Donor: Doug Zwiebel, KR2Q

Europe
OK5R (Opr. OK1ADM, OK1ADS, OK1ALW, OK1AWZ, OK1DIM, OK1RI)
Donor: K3AO Memorial (Friends of K3AO)

MULTI-OPERATOR MULTI-TRANSMITTER

World
KP2A (Opr. KP2A, AA6AA, KØRF, K1ZM, K2EK, K5VT, KC7V, N2AA, N2IC, N6DX, N7BG, WØUA, W6MSG, W6OUL, W7CB, WB3JRU, WZ6Z)
Donor: Hazard Reeves, K2GL Memorial

USA
NR5M (Opr. K2TNO, K2UA, K2UA/XYL, K5GA, K5GN, K5LZO, K5MA, K5TU, KE5IV, KG5U, KN5H, KZ5M, N5DU, N5EA, NR5M, NT5D, W5ASP, W9AGH, WB5N)
Donor: Jim Rafferty, N6RJ

Europe
OK7AA (Opr. OK3CMZ, OK3CSC, OK3CZM, OK3TPV, OK3LU, OK3TJI, OK3CBU, OK3CLD, OK3LZ, OK3YX, OK3CSQ, OK3CRQ, OK3TCJ, OK3CUM, OK3CQW, OK3CEI, OK3CDV, OK3EA, OK3CEM, OK3MB, OK3YEC, OK3TCL, OK3TMM, OK3JW)
Donor: OH-DX-Ring, OH2AM

CONTEST DXPEDITIONS

World Single Operator
9Q5NW (Opr. N6AA)
Donor: Yankee Clipper Contest Club

World Multi-Operator
EA9EA (Opr. EA9EA, EA4CPX, EA4MY, EA5BRA, EA7BUD, EA7LQ, EA7TL, EA7XC, EA9EO, EA9EU, EA9GK)
Donor: Bill Schneider, K2TT

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSO's/Zones/Countries on each band.

WORLD TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
FY5YE	122/12/27	297/16/41	805/24/63	1305/35/89	1807/30/83	971/25/78
P4ØGD	358/13/36	626/22/64	1004/26/71	893/29/80	968/30/84	1054/22/70
HD5X	34/7/9	243/18/38	909/27/67	1128/33/85	2158/34/102	760/26/60
9Q5NW	45/13/29	121/16/38	733/25/61	1055/33/84	2037/32/94	777/31/79
D44BC	133/14/36	273/16/43	719/19/55	882/31/77	1371/30/75	1538/26/82
NP4A	279/17/34	617/21/65	1419/25/76	1047/30/81	1219/26/77	801/22/61
CR9BZ	179/12/38	531/17/54	808/19/62	552/25/70	1033/26/74	1344/24/70
EA8XS	31/10/27	465/16/48	1549/24/78	581/23/50	1420/25/73	643/20/47
5L7U	108/12/27	158/18/38	527/24/53	1066/32/82	992/26/70	1349/29/79
5B4TI	167/8/38	479/13/52	1043/25/74	715/29/70	914/28/81	627/23/72

WORLD TOP MULTI-OPERATOR SINGLE-TRANSMITTER

EA8AGD	45/11/44	989/24/73	1243/21/68	906/34/87	1416/27/26	1164/27/78
V31A	224/13/24	726/22/53	1187/24/61	1109/35/79	1481/31/91	697/21/40
OK5R	88/10/52	943/21/71	865/35/101	1064/35/101	864/33/94	222/29/84
LZ9A	139/9/46	414/17/65	1426/34/104	1064/34/104	983/37/96	176/31/86
HG5A	205/10/46	771/16/64	1179/36/104	1036/36/104	850/36/92	158/32/88
EA3VY	130/12/54	708/24/73	990/24/75	1085/31/94	872/32/82	424/29/71

WORLD TOP MULTI-OPERATOR MULTI-TRANSMITTER

KP2A	711/23/65	890/23/77	2502/34/115	3422/39/129	2417/37/103	2445/32/106
EA9EA	287/11/50	1417/20/74	2084/33/95	3336/37/118	2437/39/107	1570/32/89
J6DX	783/17/54	1433/25/72	1557/23/71	1992/33/86	2464/28/84	1604/23/61
OK7AA	749/17/69	1416/25/78	2050/38/123	1994/39/125	1211/38/106	245/28/89
UP7A	780/18/70	1221/23/73	1483/34/100	1803/37/107	997/34/102	279/26/78
W3LPL	175/21/54	640/27/87	1209/39/114	1282/38/121	851/35/103	599/28/90

USA TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
K1EA	59/13/31	367/21/63	612/35/91	825/33/87	693/27/75	53/15/31
W1KM	52/14/34	582/25/72	567/30/85	553/29/73	506/25/69	204/21/59
W3GRF	15/9/11	442/18/60	787/33/91	513/36/91	571/27/78	184/20/49
N2LT	37/13/28	220/21/62	557/33/92	609/33/88	685/28/74	164/18/49
K1TO	48/11/31	276/20/67	533/30/86	827/33/92	481/24/77	71/17/41
K3TUP	55/15/37	217/21/60	491/33/90	604/31/91	699/26/75	73/20/43
K1CC	55/12/36	220/18/61	515/30/83	597/35/85	561/28/78	143/18/43
W9RE	44/16/34	230/25/60	427/31/80	536/36/89	515/28/79	116/21/47
K3LR	47/14/28	144/21/56	373/32/82	498/34/90	540/29/80	120/19/44
N6AR/4	20/10/13	160/18/54	510/35/88	333/34/84	380/29/81	246/24/60

USA TOP MULTI-OPERATOR SINGLE-TRANSMITTER

K1GQ	50/13/39	317/23/74	916/36/111	694/37/114	695/29/99	143/24/70
N2RM	49/18/46	386/24/78	798/35/112	577/36/101	645/32/94	207/26/74
N3RS	42/15/34	227/23/75	999/35/117	472/38/108	677/32/100	120/25/73
N4WW	39/16/37	204/21/71	763/34/102	423/33/96	074/33/99	138/29/79
W3BGN	62/19/45	252/24/74	700/36/107	627/35/109	465/32/94	175/27/78
N6RO	23/12/15	283/29/64	682/37/102	832/37/105	545/34/85	141/26/46

USA TOP MULTI-OPERATOR MULTI-TRANSMITTER

W3LPL	175/21/54	640/27/87	1209/39/114	1282/38/121	851/35/103	599/28/90
NR5M	69/17/29	352/27/73	1012/38/113	1185/38/120	1021/36/108	272/30/75
N4ZC	47/12/25	290/22/67	791/39/109	786/31/97	756/31/93	351/25/66
K4VX/Ø	81/19/37	367/26/68	547/36/98	1068/38/114	766/32/81	154/24/56
N1CQ	133/19/58	237/22/68	680/36/101	1105/38/109	616/26/76	159/22/61
W3GM	94/18/45	342/23/74	654/31/92	806/37/104	446/31/86	285/26/87

Algis, UP2NK/UF. Not far away UG6GAW settled for second with a score of 103K. The top European score and everybody's first HB QSO on 160 was HB9AMO. Pierre set a new European record. Back in the States top band top score goes to K5UR. Rick had to work hard to overcome the challenge of second-place finisher WB9HAD.

Multi-Operator

The world and new African multi-single record goes to EA8AGD. Operated as a DXpedition from Finland, they carried on the tradition of Finnish activity from all over the world (just look at the operators from many of the world top scores). In second place from Belize was V31A. In addition to a great effort they submitted the best-looking log we have ever seen. The great conditions allowed the old US record to be crushed by K1GQ by nearly a million points! And OK5R ended up on top in this highly competitive European category.

The new world record in the multi-multi category is held by KP2A. Blessed with great conditions and operators, they broke new ground in QSO and multiplier numbers. Breaking the world record is hard enough, but from a two area into the US makes it quite an accomplishment! Also splendid was the score of EA9EA. They broke the old world record and finished only 1.6 M behind the leader, while setting a new African record. In the US, W3LPL just missed taking the record with a fine 10.2 M effort, finishing ahead of NR5M. While in Europe OK7AA did a fine job in edging out UP7A.

The club scores reflect hundreds of hours of planning and traveling on DXpeditions. Tied together by spotting nets, individual efforts, and overseas operations, they have a special camaraderie. The two clubs that finished top in the world and Europe demonstrated all the above. The Frankford Radio Club reigns number 1, followed by the Yankee Clipper Contest Club. In Europe the Bavarian Contest Club set a new European record over their countrymen to the north, the Rhein Ruhr DX Association.

HSØA: (left to right) K2BA, K3ZO, HS1ALV, JAØJCJ, JK1CCO, JA5XOZ, with DL7MAE in front.

Closing Comments

A special thanks to all the fellows who along with their logs submitted floppy disks of their logs. This saved us hundreds of hours in computer work. We use all these inputs to create a data bank which tells us several things: at least 27,000 unique calls were in the contest; at least 220 countries were in the test; and everyone has an error rate in their log.

This latter subject is determined by finding the number of unique QSOs in a top-scoring log and when possible comparing each unique QSO to the claimed or suspected call's actual log to discover whether a copying error is present. If an error is present, then this is an unverifiable contact. We never remove a call from a log just based on computer information. After all, the computer only generates soft data. We, who administer the contest, do have an obligation to certify to the best of our ability new world records and world top scores.

Although for years your diligent committee has been quietly looking into error rates and how they are generated, this year at the international DX and Contest forums held in Visalia, California and Dayton, Ohio in the USA, the error problem came out into the open. How can an operator generate very fast QSO rates while maintaining a low error rate? There was no simple answer, but some recommendations can be made. Ask for a call repeat when you are not sure of what you copied. Transmit either as a whole or in parts the call sign of the station you work. If it's wrong, they will probably correct you or try to work you again. Most important, if you intend to submit a world contending log, remember to be careful in your operation.

We encourage the submission of floppy disks along with your hardcopy log. We accept any format but prefer ASCII. Our computer is an IBM.

Every year we are gratified by the number of multi-single entries we receive. The growing numbers indicate that you find this category interesting and fun. It allows a group of fellows to all work together to maximize the QSOs and multipliers, a feature not possible in the multi-single categories of other major contests. As a consequence of spotting nets and now packet radio, many single operators have taken advantage of the assistance to help their club scores. This has been especially true of clubs on the east and west coasts of the USA. Of course, the submission is now a *multi-single* instead of single operator entry even though

The enthusiastic crew at PA6DX.

New World Record holder Ville, OH2MM, with station master Mario, FY5YE.

there is only one op in the shack. If you look at the multi-operator, single transmitter listings for the USA, about one-third of the entries are now single-op assisted logs. Several people have written us asking that a new category of multi-operator, single transmitter be created called *single op, VHF or packet-radio assisted*. It sounds like a good idea because of the following reasons: (1) packet is growing rapidly in the USA, Japan, and Europe, and the contest should, when appropriate, keep up with technologies; (2) it allows a station with one operator to ethically tie into spotting systems and compete with other such operators; and, finally, (3) it would allow a single operator the choice of maximizing his effort to help his club's total score. If you have any advice or comments on this matter please write to the *CQ* WW Contest Committee.

Special Thanks

A big thanks to the members of the *CQ* WW Contest Committee: W1WY, AD6C, KR2Q, K2SS, N6AW, W7EJ, W9RE, N2AA, K2VV, K6NA, N6ND, N3ED, K1AR, and KE7V.

We also wish to thank all those who cooperated with the committee in log checking and verification.

Congratulations to all the winners, and see you in 1988!

73, Bob, K3EST/6, and Larry, N6AR/4

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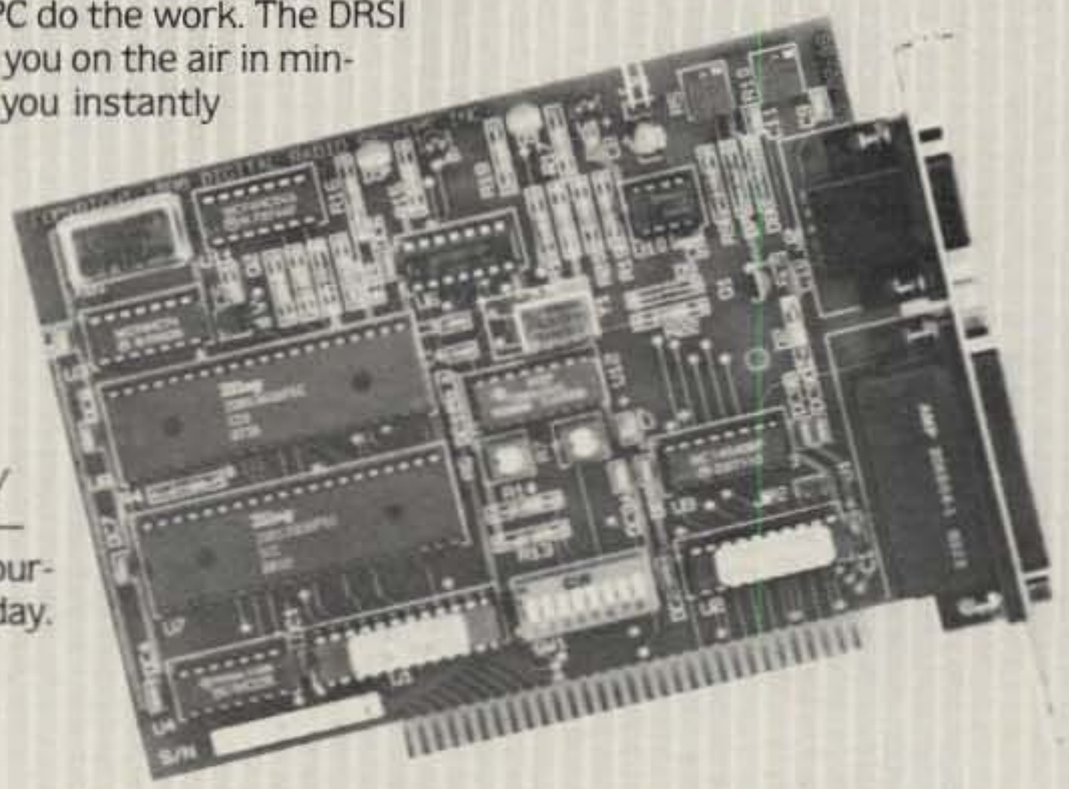

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TOP SCORES

WORLD Single Op All Band		USA Single Op All Band		Europe Single Op All Band	
FY5YE	8,201,163	K1EA	3,961,980	I4IND	4,188,034
P40GD	7,952,283	W1KM	3,885,464	OH0BH	2,848,711
HD5X	7,850,590	W3GRF	3,828,883	HA0MM	2,361,485
9Q5NW	7,586,300	N2LT	3,587,045	G3MXJ	2,233,868
D44BC	7,384,104	K1TO	3,444,319	F6BEE	2,165,946
NP4A	7,247,449	K3TUP	3,363,110	OZ1LO	2,133,460
CR9BZ	6,508,205	K1CC	3,194,147	DL4BBO	1,958,190
EA8XS	6,162,093	W9RE	2,957,682	G4BUO	1,935,810
5L7U	6,121,080	K3LR	2,629,659	YU7BJ	1,797,600
5B4TI	5,816,907	N6AR/4	2,507,960	DF3CB	1,732,776

Single Op Single Band 28 MHz					
4M7A	741,312	N4EJW	105,369	F6AUS	177,749
PY5CA	695,728	K1ZZ	104,244	G4CP	92,105
AY6EF	552,448	KU2Q	46,228	DF2UU	86,920
LU1E	492,140	K7QQ	37,944	YU3ZO	76,320
AY4F	353,682	KA2AEV	35,112	IY4FGM	72,520
KH2F	320,528	N9RD	27,158	LZ1YQ	70,928

21 MHz					
LO8WW	1,391,355	K5GO	451,764	4N4A	491,419
5H3BH	1,098,810	W5VX	421,850	LZ1KDP	474,157
ZS6BCR	989,820	K1RM	395,508	YU1LA	397,980
CX7BY	972,257	W1WEF	373,320	G3HCT	375,310
YB0ARA	695,610	K1ZX/4	370,800	G4CNY	323,520
LU1AF/D	693,765	KA5W	323,963	F6IRF	287,850

14 MHz					
EA8ID	1,212,384	K3RV/4	553,415	YT3AA	627,414
CW8B	1,011,036	KS8S	508,950	4N7N	575,355
8P9EL	911,400	K1UO	502,152	RO4OA	380,986
YT3AA	627,414	K2SS	479,479	F6GCP	343,430
4N7N	575,355	WX4G	463,696	IT9GSF	319,924
VO1QU	574,990	N5CR	408,480	SL4ZXE	318,682

7 MHz					
YW1O	758,898	W6YA	353,829	YU3ZV	709,104
YU3ZV	709,104	KM6B	351,090	IK2DVG	572,958
YX5A	621,489	N2DT	315,530	HB9CIP	417,028
IK2DVG	572,958	W4XJ	299,482	YT7A	387,393
XE1FUX	548,977	K2DM	280,140	LZ1KSN	318,230
JA7HMZ	477,450	K5RR	269,698	HA9RE	307,840

3.5 MHz					
ZC4DX	430,566	W1FV	270,692	UA2FGA	403,686
UA2FGA	403,686	WB8JBM	120,420	IO3JSS	226,164
W1FV	270,692	K5RX	116,584	UP2PCI	192,276
IO3JSS	226,164	KD2RD	114,760	DF0DX	146,580
UP2PCI	192,276	W8UVZ	95,676	DL3HAH	145,260
HK1AMW	177,120	W4NL	92,055	OH2JA	137,016

1.8 MHz					
UP2NK/UF	113,718	K5UR	28,635	HB9AMO	97,064
UG6GAW	103,016	WB9HAD	24,382	SV1NA/9	77,183
HB9AMO	97,064	W0ZV	18,054	CT1AOZ	71,336
SV1NA/9	77,183	K5NA/2	17,940	OK1DFP/P	60,270
CT1AOZ	71,336	K4TEA	13,632	YO3CD	48,672
OK1DFP/P	60,270	N4SU	9,686	G3XTT	47,808

Multi-Op Single Transmitter					
EA8AGD	9,816,540	K1GQ	5,524,602	OK5R	6,038,351
V31A	6,089,044	N2RM	5,222,100	LZ9A	5,886,114
OK5R	6,038,351	N3RS	4,979,475	HG5A	5,787,055
LZ9A	5,886,114	N4WW	4,724,200	EA3VY	5,566,462
HG5A	5,787,055	W3BGN	4,485,280	HG6N	4,973,020
EA3VY	5,566,462	N6RO	4,229,248	G0AAA/LX	4,538,229

Multi-Op Multi-Transmitter					
KP2A	25,019,982	W3LPL	10,289,144	OK7AA	11,980,725
EA9EA	23,425,035	NR5M	7,879,168	UP7A	8,996,130
J6DX	13,375,437	N4ZC	5,405,537	LX9BV	8,747,440
OK7AA	11,980,725	K4VX/0	5,364,112	PA6DX	6,928,293
W3LPL	10,289,144	N1CQ	5,320,776	YZ1U	6,584,320
UP7A	8,996,130	W3GM	4,793,674	YT5R	5,961,228

USA QRM

Good cndx, my personal best score but I sleep too much . . . *K7ABV*. Fun working a BY for the first time since 50 years ago . . . *W0RXL*. Finally worked a UG6 after 28 years of this stuff . . . *K9UIY*. Now for the QSLs from those new countries . . . *W7IIT*. For once the predicted poor cndx did not happen! . . . *WD8AUB*. Needed only zone 23 for a sweep on 40, found out after test my neighbor worked it! . . . *K8MFO*. Babysitting slowed me down but I caught a JA run while the kids napped . . . *KQ7I*. 40 was fantastic!! . . . *N8BC (and many others)*. 80 sounded like 20 . . . *K0RF, W0UA op*. Does anyone make a 10 Hz CW filter? . . . *WA7WOC*. We all experience occasional power failures, but would you believe 8 in one weekend! . . . *K9QVB*. Where are all the VK's and ZL's? . . . *K8EF*. Look forward to *CQ* WW every year even though I have to use low power with small antennas from my apartment . . . *WB8YJF*.

Packet radio was a big help . . . *K4JPD*. Is this the highest US score with no packet? . . . *K4VX/0*. Decided to go Multi-Multi at 20 hours into the contest . . . *NB1H*. Packet makes contesting more fun . . . *K1GW*. Great way to test a new Yagi! . . . *K3BSY*. One of the most frustrating things is the failure of "hot-shot" stations to identify for long periods . . . *W3VT/4*. Surprised how well a small antenna works on top band . . . *K3UA*. Note the drawings on the back of most log pages. My 4.5-year-old daughter enjoyed the contest too! . . . *K1RX*. Biggest thrill was VS6DO calling me Sunday AM . . . *KM1X*. It's getting too tough to wrestle the station away from my 9-year-old N1HFO . . . *K1SA*. Nice working BY1PK on 40M . . . *KS1L*. Cannot burn ice off antenna with 5 watts! . . . *VE1AGZ*. Ten meters is alive again, yea! . . . *WA1FCN*. QRP in contest always thrilling—77 different countries, 28 zones! . . . *W8VSK*. Missed my own country—OOPS!! . . . *KA3CRC*. First *CQ* WW contest; can't wait till next year . . . *N2GZL*. Had a bad cold, keyer broke, new antenna looked good; worked bad—great contest! . . . *WB6JMS*. Worked last few contacts for 5BDXCC . . . *WA1LVW*.

DX QRM

Unfortunately, same problem as in SSB—job! But vy good propagation on 10/15 meters . . . *SP5TT*. Thanks for contest. Very enjoyed 80. A lot of W's came in with good signals . . . *OH1PY*. This year I was celebrating the 70th anniversary of Finland with OF6 callsign . . . *OF6YF*. Worked only 80 W input, no TVI! . . . *OK3DG*. This year 28 MHz was not open to VK, but instead shortly to JA . . . *OH3TY*. Worked two new countries, 7X and FY on 1.8 MHz . . . *SP5GH*. After 7 years on VHF, returned back to HF. What a difference! . . . *YU3ZV*.

A good 40 meter band and lots of W's made a good score . . . *I4IND*. Unfortunately, it was a sudden break-down in the pre-driver stage of my TR-7 . . . *HA9RE*. Past history as a navy intercept opr. just keeps me tuning for new ones . . . *SV0AA*. Five days DXpedition to Crete to take part in the contest. Good cndx on 160 meters . . . *SV1NA/9*. I operated only 25 hours with about 100 W out, dipoles for 80 and 40 at 15 meters and a vertical lying on the roof . . . *IS0XIE*. Was glad to work many new countries for my 5BDXCC. Better cndx on 10 but not 160–80 than last year . . . *UP3BO*.I was very pleased to work on 160 M for first time . . . *UA9WZ*. Good cndx on 80 M for Japan and USA. Many tnx for a fine contest . . . *UA2FGA*. Nice to work in the pileups. CU next year! . . . *UA2FZ*.

Thanks for good contest. It's my first from home position! . . . *UP0BA*. Thanks nice contest. My best wishes to the contest committee! . . . *UP2NK/UF*. Too much QRM from all the strong European stations . . . *CT1YH*. Excellent contest, congratulations! . . . *CT1CWT*. My very first entry in a CQ WW CW as single op/all band—have a lot to learn and improve the antenna . . . *F6BEE*. RF got into clock—time was 11 minutes fast the first morning . . . *G3XVR*. Many calls from DX when calling CQ, including W6! . . . *DK5AD*. Best HF condx for years . . . *GM3RAO*. Condx good on all bands. Enjoyed every minute . . . *G3ESF*.

WW fever turned into a genuine 100 F fever on Friday . . . *PA3BUD*. N3JT/HK0 said that bloody mosquitoes were devouring him! I hope he is still alive . . . *F6AUS*. Another good weekend for fishing. See you next year! . . . *OZ8AE*. VFB 40 M openings to states both via short and long path . . . *HB9CIP*. I believe 235K points are enough for my age (75) Hi! . . . *DL1TH*. Could not avoid sleeping in school the next morning . . . *DL3NCI*. Power troubles let work only 13 hours. Hope next year things run better . . . *CU3AA*. My CW filter was like a swimming pool. I'll have to buy a better one . . . *EA1DWI*. On bands since 1926! (81 years old) . . . *F8TM*. Good to get past the first page on 28 MHz . . . *G4BUO*. Great fun! Boy do I need a beam . . . *G3NKS*. Biggest thrill was listening to own echos traveling around the world in the morning when using QSK . . . *DL4AAE*.

Got to wondering how many others were using old equipment. How about a museum station award! . . . *G3GGS*. Nice to work KG6DX on long path despite the furious European QRM . . . *F6BBJ*. My first contest ever, but it's surely not my last!! Keep up the good work . . . *OZ1BIZ*.

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Potomac Valley Radio Club	60,230,401
Dixie DXers	53,950,365
Mad River Radio Club	23,529,256
North Texas Contest Club	23,467,266
Southeastern DX Club	19,432,304
Texas DX Society	16,865,273
Kansas City DX Club	15,475,287
Southwest Ohio DX Assn	13,632,669
Willamette Valley DX Club	13,632,373
Central Florida DX Assn	12,758,600
Western Washington DX Club	12,692,285
Carolina DX Assn	11,363,141
Hoosier Contest Club	7,033,641
Society of Midwest Contesters	6,558,962
Southern Calif. DX Club	6,557,929
Over the Hill Contest Club	6,019,000
N. Florida DX Assn	5,972,278
Northern Ohio DX Assn	5,142,543
South Florida DX Assn	4,856,612
Central Arizona DX Assn	4,112,381
Northern Calif. DX Club	3,939,244
Eastern Iowa DX Assn	3,937,751
San Diego DX Club	3,585,406
Order of Boiled Owls (NY)	3,096,540
Colorado Contest Conspiracy	2,204,068
Mississippi Valley DX & CC	2,183,033
Grand Mesa Contesters	1,933,612
Redwood Empire DX Assn	1,886,361
Rochester DX Assn	1,165,951
Delta DX Assn	983,685
Rubber Circle Contest Club	852,075
Alamo DX Amigos	779,951
Murphy's Marauders	641,300
Northern Illinois DXA	602,721
Ohio Valley ARA	553,996
Greater Milwaukee DXA	366,413
Metrocrest ARS	228,690
Ashtabula County ARC	197,566
Inland Empire DX Assn	63,838
River City Contesters	43,142
Last Resort Contest Club	12,774

DX CLUB SCORES

Bavarian Contest Club	39,145,235
Rhein Ruhr DX Assn	24,288,394
North Lithuanian DXG	21,556,682
Kaunas Polytechnic IRC	11,965,851
Club Grupo Paranese (PY)	11,673,129
Bullmertz	11,403,533
Riga RC	9,155,587
Lithuanian Contest Group	8,861,592
Viimsi Radio Club	6,846,964
SP DX Club	5,931,315
Hill Top Ham Club (JA)	5,893,741
Alaska DX Assn	4,978,357
South German DX Group	4,773,696
Kiel-Canal Activity Group	4,771,602
Tohoku Univ RC (JA)	4,307,404
Uruguay DX Club	3,494,593
YU DX Club	2,426,300
Warsaw DX Club	1,805,465
G.A.C.W. (LU)	1,483,028
Z-DX-C Lvov (UB)	1,209,529
Voroshilovgrad RC (UB)	493,383
Radio Club Venezolano	458,735
DX Club Saar-Pfalz	213,048
YU1FJK Foxes Club	190,306
RC Tallinn	79,630

Meeting so many old friends from 5Z4KL days, also working across the pond on 160 for the first time with a limited power/antenna system . . . *GM3VLB*. Nice to work zone 36—9Q5NW with big signal . . . *CT1AOZ*. Used to practice fly fishing for last couple of years instead of contesting. Probably going to change my mind . . . *DK6QX*. Mrs. Propy is clearly the number 1 in this contest, yet I hope to beat her soon with the help of Mr. Sun . . . *EA2BLH*. 40 M quad did not stay up in the air from last year, hence the entry on 15 M . . . *G4CNY*. My first CW contest, a lot of new countries . . . *DL3SBI*.

Spent half a day cutting radials (50). It was worth the effort . . . *DL3HAH*. Was good to hear the W's pounding in again . . . *G3HCT*. First time I have entered a contest. Wife and kids carried meals to shack for 48 hours . . . *GM4VJV*. Computer-assisted CW far too fast at times . . . *GMØIIO*. It is great that we no longer have the handicap of 160 meters . . . *OZ1LO*. Thanks for the contest with many DX stations on the air . . . *PAØSKP*. Many new ones for DXCC . . . *PA3DMH*. Always a pleasure to shake "keys" with old friends . . . *GW3JI*. Mni stations with big signals but no ears! . . . *HB9DDZ*. Biggest thrill to stand up after 42 hour contest and only 5 hours sleep, because of the university! Thanks for nice contest . . . *DL4BBO*.

Without CW filter, first time I enter the contest with very much modest equipment . . . *EA5BQG*. The best contest! . . . *F6GCP*. Enjoyed every minute . . . *G3ESF*. If only I could have worked all those I heard on 160! . . . *TR1G, op. TR8JLD*. Tnx to all those stations who only worked me once . . . *SMØAJU, op. 5H3BH*. 75N 95W is not the place to be during a DX contest . . . *VE8CDX*. The hard disk of my computer broke during log processing . . . *OH5XT, op. EA8XS*. Listened twenty minutes to a station in zone 24; never got his call because he never sent it! . . . *VE3NBE*. Extreme QRN on 40 and 80 allowed me a few hours sleep . . . *ZS6BSZ*. Surprised at the lack of S. American activity on 40M . . . *KG6DX*. Next year hope to have better antenna, high power or better propagation, whichever is cheaper . . . *KD6TB/KH2*.

I need this contest to help my DXCC . . . *YC3HCM*. Great to work the rare DX . . . *VU2REC*. A great contest! Pity I had to take time off to eat and sleep . . . *VK8AV*. Long way to travel for a contest but worth it . . . *KYØT, op. ZD9CM*. In spite of my visual disability I was able to make 803 QSOs . . . *VU2TTC*. What a thrill to be on the end of a 10M pileup! . . . *ZC4EE*. Was mistaken for a terrorist by the security police when working on aerials at 03Z . . . *4Z4DX, op. ZC4DX*. Still can't believe I didn't hear zones 9, 14 or 38 . . . *KH2F*. I had an important appointment in the USA but decided not to miss the fun and postponed it until next week . . . *HZ1HZ (We all appreciate it, Ahmed!—eds.)*. Glad to catch D44BC and LU1ZA . . . *VE6APN*.

I will return to Belau for the '88 contest . . . *JE1JKL, op. KC6CS*. My first CQ WW CW contest, FB! . . . *DU3BAA*. Murphy, who's that? . . . *TA1KA/2*. Operated from a hotel room on the north shore of Oahu . . . *WR6M/KH6*. Thank God for CW filters, memory keyers and computers in that order . . . *VO1QU*. Only three new countries because of power line damage after 20 hours . . . *YC2UDH*. As usual a great contest! . . . *VE7DLM*. Low band antennas must be improved! . . . *OH2KI, op. 5L7U*. 40M was best to states around 07Z . . . *9L1GG*. Hope to have a beam and 80M dipole next year . . . *CT3CU*. The phone kept ringing! Fun contest . . . *DU1KWT*. Worked USA on 10! . . . *VU2ZAP, op. VU2Z*. Good propagation on 10 . . . *EA8ABR*. I'm afraid I could not break the world record with my inverted vee and barefoot xcvr . . . *EA8BLC*.

Having to work first 10 hours and having uninvited guests sure puts a crimp in time . . . *YB3ASQ*. Was going to pick USA ops as the best until I did the dupe sheets. JA's still #1 . . . *K5BDX, op. YJØA*. Lost 40M beam on Thursday so decided to go single band . . . *ZS6BCR*. Just received the CN8 ticket . . . *WA4UAZ, op. CN8FC*. Propagation unfortunate this year on 20M . . . *JY5DP*. Thanks to a good 10M opening, a better result than last year . . . *YBØATB/3*. First single band effort in a long time . . . *YBØARA*. Top band poor until last 2 hours of test, then excellent . . . *VE3INQ*. This is my first CW contest for last 5 years . . . *YB1BZ*. Exciting

to discover DX on 1.8 . . . *PA2DXY*. We made our own new record, a million better than last year . . . *OF1AF*.

No motor indication on 40M Yagi. We had to look outside, but that was another story during darkness . . . *F5IN*. Old equipment still going strong (Drake C-line) . . . *DJ4AX*. Fantastic contest! . . . *SP2PMO*. We exchanged the comfort of our Jersey hotel to operate from the ladies bathroom at a snow-covered campsite in Luxembourg! . . . *GØAAA/LX*. Beat the old KL7 record by nearly a million points . . . *NL7G*. Putting up all the antennas in 1 week and then down in 1 day . . . *EA9EA*. I was very sorry we couldn't be running on 20M band on Saturday evening because of interference to experiments . . . *JA2YKA*.

STATION OPERATORS
MULTI-OPERATOR SINGLE TRANSMITTER

AA1K & AD3V, K3WJV, N8NA. **AA4DO** & Net. **AA4MJ** & W4GCB. **AI3E/1** & Net. **AJ3H** & Net. **BY1PK:** Chen S.-Dong, Gong Ke-lu, Tong Xiao-Yong, Wang Guo-Xiang, Yan Pi-Dong. **BY4AA:** Gao, Giu, Hu, XuRu, Zhou. **BY4SZ:** Chen, Gao, Jiang, Ting, Xu, Ye. **DFØXZ:** DK4DW, DK4DX, DL4DAB, DL1DAS. **DJ1OJ** & DJØIP, DL5MAE. **DJ4AX** & DK4TP, DL9GS. **DKØMM:** DJ7IK, DJ8WL, DL4FJ. **DKØOI:** DD7AE, DH3BAH, DJ3WM, DJ3XD, DJ7MG, DK1GF, DK1II, DL5OAP. **DKØTZ:** DF3SV, DJ5AI, DL1SBF, DC3SA. **DK9WI** & DF3WI, DF4PD, DF9WB, DF6WR, DK5PZ, DK6WJ. **DLØER:** DK7FP, DL8DAV, DJ5GN, DF5EN, DL9XY. **DL6MAO** & DL1MAJ. **DL7AEY** & DH7ABY, DL7ALM. **DX1CW:** DU1CJC, DU1COO, DU1CWT, DU1DLC, DU1DWY, DU1DZA, DU1EFS, DV1AOC, DV1EBC, DV1GPE, DV1MDS, 4F1ARC, 4F1BYN, 4F1DMD, 4F1FP, 4F1FZ. **EA3VY:** EA3AIR, EA3AVV, EA3DXD, EA3FER, EA3KU, EA3LL. **EA7TH** & EA7CFW. **EA8AGD:** OH8LP, OH8NW, OH8PF, OH8SR. **F5IN** & FD1LGE, F6ARC, F9IE.

F6ENV & F6DUR. **FF6KED:** F6EKR, FD1MEO, FD1LBM. **FF6KPQ:** F6DZD, F6ETI, F6IFI. **HAØKLE:** HAØLC, HAØMK, HAØNNN, HAØVI, HAØOB, HAØVO. **HA1KRR:** HA1ZZ, HA1DRR, HA1XU, HA1XO, HA1ZN, HA1DRM. **HA3KNA:** HA3FO, HA3OV, HA3NS, HA3NU. **HA5KKC:** HA5LV, HA5MA, HA5MD, HA5MO, HA5OG, HA5WU, HA1US. **HA6KNX:** Gyurko,J., Gyurko,G., Zsolt, Locsei Nandor. **HA6KQD:** HA6VS, HA6XE, HA6VV. **HA6KZS:** Szasz,F., Szasz,P., Lukacs. **HA8KVK:** HA8ZO, HA8VK, Lukacs. **HB9CVQ** & HB9CWE, HB9DDY, HB9CAT. **HG1S:** HA1TJ, HA1TD, HA1DAC, HA1SV, HA1DAE, HA1AN, Muller, Finta. **HG5A:** HA5GF, HA7RY, HA5AWH, HA5WE, HA5UA, HA5LN, HA5OM, HA5FM, HA5ML, HA5MK. **HG6N:** HA6ND, HA6NY, HA6ON, HA6NQ, HA6OQ, HA6NF, HA6YG. **HG6V:** Bocsi, Dienes, Molnar, Simon, Vereb, Peto. **HG7B:** HA5WA, HA5DW, HA7UG, HA8FM, HAØDU, HA7SR. **HG8Q:** HA8IE, HA8LKE, HA8JV, HA8-806, Gyari, Pantya. **HG9R:** HA9OA, HA9PP, HA9RP, HA9RU, HA9RX, HA9RG.

HSØA: HS1AOR, HS1ALV, HS1AMH, K3ZO, DL7MAE. **HZ1AB:** G4WZI, KB6SSW, N4KT, W7SE. **IK2EGL** & I2VXJ, I1XPQ, I1ZEU. **IY1TTM:** IK1HLI, 2nd op. **JA1YAD:** Hisaya, Gemae, Boke. **JA2YAC:** JJ2PAJ, JK2RZO, JK2SBA, Bito, Iwakura, Kinpara, Matsumoto, Oba, Sahashi, Sato, Toyama, Tozuka, Wada. **JA2YEF:** JF2ACB, JF2NFC, JI2LPD, JI2SIC, JJ2LYF, JJ2VFE, Okumura, Yamamoto. **JA3YBF:** JA9UXW, JH9JFH, JH9GRM, JJ2ICA, JJ3IMX, JJ3KGS, JN1DPL, JO1IPS, JO3DWD. **JA4YJA:** JE4DNQ, JG6PAF, JJ3LJU. **JA7YAA:** JE3DDT, JE4KZZ, JE7HFL, JE7QCQ, JHØORW, JJ3CNL, JM1ONJ, JN1VYN, JP1EIR. **JA7YAB:** JHØMGJ, JJ1NNJ, JQ1HKN. **JA7YFB:** JE7WJB, JF7AAD, JF7LEI, JF7TDN, JG7HMD, JHØTUH, JN1RON, JQ1NBV, JR7RLB, JR7WFH, JRØNUZ. **JA8YBY:** JH8GFB, JH8WBR, JR8DQB, JJ2VXS, JO1DFG. **JA9YAA:** JG2KKG, JN3QCB. **JA9YBA:** JA9LNJ, JA9OTX, JA9PPC, JA9VDA, JH9VSF, JA9-10148.

JAØYAK: JS1PTU, JE7GWO, JE7UXP, JHØELL, JHØNVX, JHØMVU, JHØOPX, JHØDPM, JHØRGJ, JHØSDA, JHØTJU, JHØVVW, JHØUSD, JHØXUP, JHØXGL, JHØVYG, JRØCDR, JRØDVM, JRØXEY, JA9VSX, Saga, Tuchiya, Chinda, Hatori, Sekine, Nitta, Wada. **JE2YRD:** JA2EZD, JA7RHJ, JF2VZU, JI2KVW, JM1LRQ, JR2SCJ, JR2SQU. **JE3ZFS:** JG3WBB, JI3JGJ, JK3HZH. **JE6ZIH:** JA6QJG, JF6DEA, JF6TMH, JG6CVO, JH6DHP, JH6NBN, JR6GKT, JR6NXU. **JH1YDT:** JH4UTP, JK1PIV, JO1HSX, JO1IDL. **JH4YNT:** JF6BPL, JM3ILK, JR4KTO. **JJ1ZXE:** JA1RIZ, JO1SYQ. **JR1ZTT:** JN1MSO, JP1MWR, JR4WKV, JR5PMI, JF7WED. **K1DG** & Net. **K1GQ** & K1AR, K1JX, KC1F, AK1A, AA2Z. **K1IU** & Net. **K2TD** & Net. **K3IE** & N3ARK, KB3MM. **K3KG/4** & Net. **K3NZ** & Net. **K3OO** & WB2P. **K3UEI** & Net. **K3WW** & Net. **K4CEF** & Net. **K4MF** & Net. **K4XR** & Net. **K6TQ** & WN6K. **K8AZ** & K8MR, K8NZ, N8AA, KQ8M, KR8Y, W8HSK, W8KIC, WB8PHI. **KA1CB** & Net.

KA1KPH & NC1B. **KA1X** & AK1L. **KE6WL** & Net. **KL7HKX:** AL7HW, KL7AF, NL7IY. **KL7RA** & AL7CQ, AL7HC. **KM1C** & NK1F, W1PH. **KQ2O** & K2BK. **KS3F** & NE3F. **KT1O** & Net. **KY1H** & NB1Y, KB1W, KY1K, NJ1T, NT2X, N1EMG. **LZ1KKI:** Vassilev, Komsalov, Dimitrov. **LZ1KNP:** I. Iliev, D. Iliev. **LZ1KRC:** Pavlov, Dinu, Boianov. **LZ1KTM:** Kozeteb, Kzastev. **LZ2KSQ:** LZ1F-156, LZ1F-230, Georgiev. **LZ9A:** LZ2PO, LZ2DF, LZ2CC, LZ2HE. **N1AU** & Net. **N2MM** & Net. **N2RM** & WA2HGM, N2ME. **N3BB/5** & WD5N, WB5VZL, NZ5A. **N3RS** & N3RD, K3JJG, NA3K, N3BNA, KT3M. **N4RJ** & K4PI, KM9P. **N4WW** & KØLUZ, KU4J. **N5RM** & WG5J. **N6JV** & Net. **N6OU** & Net. **N6RO** & K3EST, WA6VEF, NB6G, N6IG, N6NE. **N6VV** & K6XV, K6PJY. **N8LM/4** & KØHLB, WØMHS, WB4SPB. **NC1B** & Net. **NF2L** & Net. **NH6L** & N5CT, NH6MQ, Ernie. **OF1AF:** OH1EB, OH1EH, OH1HS, OH1KA, OH1NOA, OH1NSJ, OH1WF, OH6LI. **OF2BAH:** OH2PQ, OH2BAH, OH2BKF, OH2BMD. **OF2NQ:** OH2BCI, OH2BFP, OH2BIG, OH2BQW, OH2BUQ, OH2LQ, OH2NRV.

OH1AD: OH1EG, OH1EP, OH1BSJ, OH1SX. **OH2TI:** OH1JL, OH2BSI, OH2BZY, OH5BA, OH6DD. **OH7AB:** Club. **OK2DOD:** OK2BDI, OK2WAZ, OK2BHM. **OK2KMR:** OK2BQZ, OK2-30624, OK2-31057, OK2SAA. **OK3KGQ:** OK3CLL, OK3ZCD, OK3ZBQ. **OK5R:** OK1ADM, OK1ADS, OK1ALW, OK1AWZ, OK1DIM, OK1RI. **OK5W:** OK1AEZ, OK1AAU, OK1AII, OK1APJ, OK1TA, OK1TN, OK1CF, OK1WT. **ON6AH** & ON4GO, ON6MH, ON6QR, ON6VL. **OZ1ALS:** OZ1KVF, OZ1LPR, FE1JDG/OZ. **OZ5EDR:** OZ3QN, OZ8SW. **PAØKHS** & PA3ADJ, PA3ENJ, PBØAHO, SP4FCG. **PA2DXY** & PAØVDV. **PI4DEC:** PA3AWW, PA3BXD, PA3CZW, PA3ENO, PA3ERA, PAØTUK. **PJ2X:** K1XM, KQ1F. **RFØFWW:** Club. **RL7PZZ:** UL7PCU, UL7PEA, UL7PHB, UL7PO, UL7-23-7, RL7PEO. **RL8PYL:** UL7PAE, UL7PAZ, UL7PCZ, RL7PHL, RL7PKN. **RZ4HWW:** UA4HBR, UA4HEM, UA4HNQ. **RZ9OWA:** UA9OF, UA9OFB, UA9OLW, UA9145-207.

SK5EU: SM5ODQ, SM7OUU, SM4KWO, SM5LZM. **SLØCB:** SM6LRR, SM3LGO, SMØMLL, SMØNSJ, SM3NSK, SM5OHI, SMØPHU, SMØNZY. **SM2OJR** & SM2JVH, SM2GYP. **SP2KQU:** SP2BAS, SP2HPD, SP2EWQ, SP2JEO. **SP2PMO:** SP2JS, SP2JKS, Karol. **SP2ZFJ:** SP2ASJ, SP2FAP, SP2LNW. **SP2ZHB:** SP2AYC, SP2BIK, SP2HJL. **SP5PBE:** SP5ANJ, SP5ELA, SP5GIQ, SP5JTF, SP5JTM. **SP7KWW:** SP7HOR, SP7LSE, SP7HOV. **SP8KBM:** SP8GNI, SP8HZZ, ex-SP8GQU, ex-SP8ARY. **SP8PFI:** SP8ONW, SP8LBO. **SP9KUZ:** SP9DCH. **SP9PKR:** SP9LAM, SP9LAO, SP9RPT. **UBØSZZ:** UB5SBF, UB5SBN, UB5SBZ. **UB3IWA:** RB5II, UB5IFZ, UB5IMZ, UB5IOK. **UB3JWW:** Club. **UB4CWA:** Club. **UB4CWW:** RB5CB, RB5CW, UB5CCN, UB5CCP, UB5-80-70, UB5-80-532. **UB4CXU:** UB5CBU, UB5CDX, UB5CKA. **UB4DWW:** Club. **UB4EXU:** UB5EJB, UB5EOD, UB5EPT. **UB4EYN:** UB4EN, UB5-60-759, UB5-60-2786. **UB4FWC:** Club. **UB4FWH:** RB5FH, UB5FCK, UB5-70-265.

UB4FXX: UB5FJA, UB5-70-321, UB5-70-507. **UB4IWI:** RB4ITG, RB5ICY, UB5IHS. **UB4IWN:** UB4IRI, UT5SI, UB5-73-3578. **UB4IZA:** UB3IBZ, UB5ITC, UB5-73-3137. **UB4JXT:** Club. **UB4LWY:** UB4LEZ, UB4LFB, UB5-77-1785. **UB4MWU:** UB4MWU, UB5MBM. **UB4QWV:** Club. **UB4QWW:** RB5QW, UB5QDU, UB5-64-866. **UB4RWW:** Club. **UB4TWL:** Club. **UB4WWA:** UB5-68-799, UB5-68-1041. **UB4WXZ:** Vlad, Vlad, Alex. **UB4WYA:** UB5WCG, UB5WDW, UB5-68-309, UB5-68-946. **UB4WZB:** Pozigun, Petrenko. **UB4XWB:** UB5-62-56, UB5-62-240. **UC1AWB:** RC2AZ, UC2AAX, UC2ADX, UC3AA, UC2-188-99. **UC1AWP:** Alex, Andrew, Jim. **UC1AWZ:** RC2AP, UC2-188-40, UC2-188-41, UC2-188-123, UC2-188-148. **UF7QWW:** UF6QAU, UF6QAW, UF6QR. **UL8BWW:** UL7BB, UL7BAG, UL7BBQ, UL7BBW, UL7BY, UL7-16-389. **UL8CWA:** Club. **UL8CWW:** Mich, Alex, Vlad. **UP1BWG:** UP2BLF, UP2BZ, UP2DT.

UP1BWW: UPØBA, UP2BKW, UP2BMW, UP2BIJ, UP2PX, UP2-38-1244, UP2-38-1052. **UP1BXR:** UP2BN, UP2BPI, UP2BJK. **UP1BYC:** UP2-38-2505, UP2-38-2504. **UP1BYK:** UP2BFY, UP2BJV. **UP1BZA:** UP2BIM, UP2BLW, UP2BNY, UP2OX, UQ2GJH, UQ2GNL, UR2RDZ, UP2-38-1734. **UP1BZG:** UP2QA, UP2BCO, UP2BCW, UP2BCT, UP2BRJ, UP2BOC, UP2-38-439. **UP1BZL:** UP2BBL, UP2BNW. **UP1BZM:** UP2NK, UP2-38-1787. **UP1BZM/A:** UP2-38-1787, UP2-38-1820. **UP1BZO:** UC2IAP, UC2IDR, UP2BFN, UP2BMX, UP2BOQ, UP2BNC, UP2-38-346, UP2-38-1751. **UP1BZQ:** UP2BAT, UP2BMQ, UP2-38-1682. **UQ1GWW:** RQ2GG, UQ2GAG, UQ2OI, UQ2GLK, UQ2GOU, UQ2-37-116, UQ2-37-83. **UR1RWX:** UR2RJ, UR2RRR, UR2RDJ, UR2RHF, UR2RNA, UR2RNX, UR2-83-165, UR2-83-1005. **UR1RXX:** Club. **UT4UWL:** UT5UJO, UT5-186-205. **UT4UXW:** UB5CGN, UL7LER, UT4UX, UT4UZ. **UZØAXX:** UAØAGI, UAØAMA, UAØAFC, UAØ-103-712, UAØ-103-729, UAØ-103-235. **UZØCWW:** Club. **UZØFWA:** UAØFAD, UAØFFH, UAØFGF.

UZØFWD: UAØFER, UAØ-153-280, UAØ-153-378, UH8-44-21. **UZØJWA:** UAØJA, UAØJAB, UAØJB. **UZØLWO:** UAØLGK, UAØLD, UAØLS. **UZØLWX:** RAØLDX, UAØ-107-888, UAØ-107-770. **UZØOWO:** Club. **UZØQWA:** UAØQDL, UAØQN, UAØQAS, UAØ-98-113, UAØ-98-107. **UZØQWF:** UAØQFR, UAØQGX, UAØQII. **UZØSWA:** Club. **UZØSXC:** UAØSME, RAØSIF, RAØSHT, UAØSNY. **UZ1AWO:** RA1AW, UA1AAF, UA1AKC. **UZ1AWT:** RA1CA, UA1ALZ, UA1ANA. **UZ1CXF:** Club. **UZ1OWJ:** UA1OAA, UA1-113-31, UA1-113-69. **UZ1NWA:** UA1NDI, UN1-88-391, UN1-88-525. **UZ1NWF:** UA1NBN, UN1-88-24, UN1-88-302. **UZ1PWA:** UA1PBA, UA1POL, UA1-114-26. **UZ1TWB:** UA1TAE, UA1TEI, UA1UM. **UZ1WWA:** Club. **UZ3AWR:** RW3AO, UA3AO, UA3ABJ, UA3ABJ, UA3AHP, UA3ASL, UW3GC, RA3AX, UA3-170-377. **UZ3AXH:** Alex, Slav, Vlad. **UZ3AXX:** Club. **UZ3QWM:** UA3QAO, UA3-121-2913, UA3-121-3109.

UZ3TYE: Club. **UZ3TZA:** Club. **UZ3WWW:** Club. **UZ4FWA:** UA4FAT, UA4FZ, UA4-148-363, UA4-148-481. **UZ4LXA:** UA4LR, UA4LW, UA4LNK. **UZ4WWA:** UA4WA, UA4WEJ, UA4-95-683, UA4-95-729, UA4-95-754. **UZ4WWB:** Club. **UZ6LWZ:** UA6LV, UA6LUQ, UA6-150-1336, UA6-150-1403. **UZ6LXM:** UW6OE, UA6-150-945, UA6-150-1345. **UZ6LXP:** Club. **UZ6YWB:** Club. **UZ9AWD:** RA9AFX, UA9AMG, UA9AQN. **UZ9AYA:** UA9AKI, UA9QCC, UL7LT, UM8NR, UW9AR, RL7LCX, RL7LES, Serge. **UZ9CWB:** RA9CIB, UV9CAI, UA9-154-973. **UZ9CWW:** UA9CBP, UA9CDC, UA9CIU. **UZ9CYP:** UA9CUA, UA9-154-2105, UA9-154-2106. **UZ9QWM:** Club. **UZ9SWT:** UA9SAF, UA9SBM, UA9SBU, UA9SDB, UA9SGS, UA9SJV. **UZ9SWY:** UA9SHO, UA9SAW, UA9SJV, RA9SVT, UA9TS, UA9TZ. **UZ9UWK:** Club. **UZ9XWV:** UA9XC, UA9-90-393, UA9-90-1053, UA9-90-1058. **UZ9XWW:** UA9-90-601, UA9-90-622, UA9-90-644. **UZ9XXM:** UA9XF, UA9-90-400.

V31A: KØRWL, KBØG, KBØU, WB9JKI, WØJLC. **VE2LJ** & VE1BHA, VE3SMA. **VE2UL** & VE2WA. **VE3OXT** & VE3NZQ. **VE7UBC:** VE3HTT, VE7CMK. **VE7ZZZ:** VE7AV, VE7ARS, VE7DP, VE7EOC, VE7SK. **VP5W:** K6ANP, KK6X, W6OSP, WW6F. **VU2TEC:** VU2FOY, VU2NJZ, VU2TEJ, VU2TER. **WØNA** & WØAR, WØCY, WØYR, WØZL. **WØRLX** & NQØI. **W1GG** & Net. **W1PH** & Net. **W2UI** & N3KR. **W3AZ** & Net. **W3BGN** & KM3T, N3ED, K2TW. **W3GG** & K3RT, K3YGU. **W3XU** & Net. **W4FX** & W2GW, N4SZ, WA4JWS. **W6BA** & N6AV. **W6BIP** & KK1A/6. **W6ERS** & Net. **W6OAT** & WX5S, W6SZN. **W8ZF/4** & Net. **WA3IJZ** & Net. **WA4CTC** & Net. **WA4KIL** & Net. **WA4QQV** & WA4QMQ. **WA8DXG** & W8JGU, WA8BIN, N8DCJ, NY8P. **WB1CNM** & N1BVZ. **WB3CAC** & Net. **WB4GNT** & Net. **WR6R** & AK6T, K4UVT, KI6EZ, NB6L, K6ZM, JM1CAX. **WV6N** & W6UQF.

Y31CE: Y23HE, Y31UE, Y31PE. **Y34K:** Y24UK, Y23EK, Y22TK, Y42LK, Y42MK. **Y35L:** Y26BL, Y26IL, Y26WL, Y33UL, Y33VL. **Y37CB:** Y37ZB, Y37WB, Y37RB, Y37QB. **Y41CA:** Y41ZA, Y41YA, Y41TA, Y21FA, Y23BA, Y23JA. **Y42CB:** Y42ZB, Y23GB, Y42WB. **Y45CM:** Y45ZM, Y45WM. **Y66CA:** Y66ZA, Y66XA. [YBØZAB: YBØBMT, YCØKLP, YCØQR, YCØEMJ, YDØHWH, YDØRVG. **YT2B:** YU2NK, YU2VR, YU2DU, YU4IEF, YU2RS801. **YT3T:** YU3BQ, YU3HR, YT3EW, YT3VT. **YT4D:** YU4LA, YU4FA, YU4NC, YU4RS1036. **YT4M:** YU4BR, YU4WW, YU4GB, YU4CBC, Goran, Zoki, Gordan, Dan, Darko. **YT5R:** YU5OC, YU5GB, YU5RS109, YU5RS126, YU5JA. **YU3AI** & YU3BM, YU3EO, YT3WW. **YT3T:** YU3BQ, YT3EW, YT3VT, YU3HR, YT3NA. **ZS1CT:** ZS1HAX, ZS1JX, ZS1QM. **4N2D:** YU2FK, YU2TL, YU2WQ, YU2CQ, YT2ID, YT2DU, YU2BHI. **4N4D:** Zijadic, Bralo, Tokic.

TNX to the boys at VE2LJ for handing out zone 2.

STATION OPERATORS
MULTI-OPERATOR MULTI-TRANSMITTER

DA1WA: DA1LO, DA2HS, DA2HX, DA2JL, DJØLC, DJ1MU, DJ9CB. **DLØKF:** DF3LP, DF3LZ, DF6LH, DJ2BV, DJ3UL, DJ4FZ, DJ4SO, DJ6TK, DJ6TN, DJ7SW, DJ8HB, DK5TI, DK8LD, DK8LE, DK9AV. **EA9EA:** EA4CPX, EA4MY, EA5BRA, EA7BUD, EA7LQ, EA7TL, EA7XC, EA9EO, EA9EU, EA9GK. **GØAAA/LX:** G3SXW, G3TXF, G3WVG. **J6DX:** KA9QYA, K6GXO, NC8Q, W8ILC, W8PR, W8RKL, W8WPV, WB8ENR, WD8IXE. **JA1YXP:** JHØRRR, JH9CAV, Y. Kaihatsu, N. Youso, H. Oyagi, Y. Sasaki, E. Ogawa. **JA2YKA:** JE2JCV, JE2VBZ, JE2VYM, JE4LIK, JE7BIZ, JF2DQJ, JF2UTL, JG2MTC, JG2VTD, JG3OET, JH2QXG, JI2UHH, JJ1MVV, JK2CZL, JR7OMD, Kei. **JA3YKC:** JA3ODC, JA2VUP, JA5GZB, JH4RHF, JI3ERV, JH4PAM, JG3HLV, JR4PMX, JE6LPM, JG3CPF, JG3MRT, JG3WDN, JR5ARQ, JG6VTM, JR5WLA, JF3VXV, JO3LSH, JF4IXU, JR5PDJ, Ninomiya. **JE1YEM:** JAØQPG, JA5BXW, JA7PHV, JF1PHY, JH1IZR. **K1GW** & Packet.

K4JPD & K4FD, N4DVW, NQ4I. **K4VX/Ø** & K9BGL, K9FD, KAØGGI, NA9D, NSØZ, NU9R. **KP2A** & AA6AA, KØRF, K1ZM, K2EK, K5VT, KC7V, N2AA, N2IC, N6DX, N7BG, WØUA, W6MSG, W6OUL, W7CB, WB3JRU, WZ6Z. **LX9BV:** DF4RD, DF8WS, DJ1US, DL2NBU, DL4NAC, DL4ZBK, DL6FBL, DL6RAI, DL8ZBR, LX1JP, LX1WW. **N1CQ** & AG9A, K1BW, K9ZO, KC1Q, KA1GQW, KA1XN, KD2SX, KI2P, KM1P, W1ETH. **N3LR** & K3ZA, KD3DM, KR3W, N3FOB, N3NA, NJ3A. **N4ZC** & AA4S, K2SD, N9CC, W4NUS, WA8MAZ. **N6ND** & AA6RX, K6JYO, KA6SAR, KI6MS, KV6O, KZ6E, N6CW, NI6W, WA6OTU. **NB1H** & K1FWE, K1MNS, K1ST, W1IHN. **NL7G** & KL7PJ, KL7U, KL7Y, NL7GP, WL7Y. **NR5M** & K2TNO, K2UA, K2UA/XYL, K5GA, K5GN, K5LZO, K5MA, K5TU, KE5IV, KG5U, KN5H, KZ5M, N5DU, N5EA, NT5D, W5ASP, W9AGH, WB5N. **OH1AA:** OH1DL, OH1HD, OH1KO, OH1LD, OH1LF, OH1MD, OH1NHU, OH1SV, OH1SW, OH1SY, OH1WR, OH6DO. **OK7AA:** OK3CMZ, OK3CSC, OK3CZM, OK3TPV, OK3LU, OK3TJI, OK3CBU, OK3CLD, OK3LZ, OK3YX, OK3CSQ, OK3CRQ, OK3TCJ, OK3CUM, OK3CQW, OK3CEI, OK3CDV, OK3EA, OK3CEM, OK3MB, OK3YEC, OK3TCL, OK3TMM, OK3JW.

PA3ACA & PA3ALP, PA3AQL, PA3BWD, PA3CAL, PA3ELX, PDØMCL. **PA6DX:** PAØCOR, PAØERA, PAØJMH, PAØLVB, PAØVAJ, PA3ABA, PA3BAS, PA3BFM, PA3CEE, PA3CEF, PA3CTM, PA3CWM, PA3DFT, PA3DQW, PA3DWD. **UP7A:** UP2BAW, UP2BIG, UP2BIL, UP2BRF, UP2CY, UP2PAJ, UP3BF. **VE3RCS:** VE3DXY, VE3KFS, VE3PJL, VE6MBX. **WØAIH/9** & KØFVF, KMØO, KNØV, WØUC, WAØRBW, WAØSVR. **W3GM** & K3GM, K3LZ, K3ND, K3RL, N2EA, N3RG, W3FV. **W3LPL** & AI3M, G4KFT, K3RA, KE9A, KT3Y, N8II, ND3A, NG1W, NW5E, W3EKT, WB2EKK, WD4AXM. **YB4ZZ:** YC4GAP, YD4HLQ. **YT2R:** YU2DQ, YU2HO, YU2IR, YU2KM, YU2LJ, YU2MM, YU2MY, YU2NJ, YU2OG, YU2OH, Kreso, Robert. **YZ1U:** YU1BL, YU1FY, YU1JW, YU1UN, YU1UY, YU1XA, YU1XK, YU1XV, YU1ZZ, Aco, Djuro, Mire, Neso.

WORLD TOP 10 QRP
(5w output)
All Band

1. VE7DX	687,690	6. LZ2QV	282,741
2. YU3BC	512,148	7. RA1AL	253,344
3. G4ELZ	359,883	8. W8VSK	248,638
4. RT4UB	340,380	9. UA4LDJ	240,100
5. UB5WAB	310,764	10. UD6DFF	227,700

Team Contesting

1. **Team America** (P40GD, 9Q5NW, D44BC, 5B4TI, XE2MX) . . . 30,525,064
2. **Team Scandinavia** (FY5YE, CR9BZ, EA8XS, 5L7U, OH0BH) . 29,841,252

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, Zones, and Countries. Certificate winners are listed in boldface.

CW RESULTS
SINGLE OPERATOR
NORTH AMERICA
UNITED STATES

K1EA	**A**	**3,961,980**	**2608**	**144**	**378**
W1KM	"	**3,885,464**	**2464**	**144**	**392**
K1TO	"	**3,444,319**	**2236**	**135**	**394**
K1CC	"	**3,194,147**	**2091**	**141**	**386**
K1XA	"	2,318,818	1755	124	333
K1VR	"	2,227,980	1678	129	341
KS1J	"	1,190,226	1275	93	233
W1BIH	"	1,057,032	881	121	303
W1FJ	"	926,094	870	104	279
W1WAI	"	754,280	784	98	248
KA1DWX	"	728,330	735	100	246
K1RX	"	675,402	870	69	204
KF3N/1	"	605,634	552	104	282
W1MK	"	517,845	765	64	173
WA1UDH	"	440,664	523	89	212
KG1D	"	369,252	495	81	184
N1ELN	"	361,514	474	76	195
NB1B	"	331,224	419	92	204
K1SA	"	316,110	429	76	181
K1CLN	"	296,468	391	86	188
W1BR	"	277,389	383	80	179
W1GIH	"	158,700	250	73	157
K1TR	"	146,730	266	72	129
KA1CLV	"	96,824	195	53	129
W3SOH/1	"	90,000	185	56	124
WA8SWM /1	"	86,668	177	67	121
K1NH	"	79,336	166	66	122
W1JR	"	53,583	122	58	101
N1DC	"	46,480	155	34	78
K1MEM	"	34,181	92	49	84
KR1R	"	29,596	109	34	64
AB1U	"	28,888	113	33	59
WA1LVW	"	28,595	114	33	62
WB2DND /1	"	23,500	83	35	65
KC1F	"	16,562	79	37	54
K1FIR	"	13,688	84	20	38
W1OPJ	"	8,732	58	19	40
W1PLJ	"	8,415	59	19	32
N1ACH	"	7,150	48	20	35
NM1K	"	4,982	43	19	28
K1ZZ	**28**	**104,244**	**376**	**28**	**74**
WA1FCN	"	25,272	125	19	53
W1AX	"	24,180	117	21	57
K1RM	**21**	**395,508**	**971**	**35**	**103**
W1WEF	"	373,320	938	34	102
KM1X	"	170,772	549	28	79
N1BUE	"	46,956	200	23	61
K1UO	**14**	**502,152**	**1180**	**38**	**109**
K1EFI	"	115,649	368	29	80
W1XN	"	109,120	431	27	61
K2MN/1	"	34,608	146	25	59
K8PO/1	**7**	**257,312**	**647**	**34**	**102**
KS1L	"	240,956	702	32	86
N1AC	"	204,620	539	35	95
W1FV	**3.5**	**270,692**	**790**	**28**	**90**
K1IK	"	6,292	52	12	32
N2LT	**A**	**3,587,045**	**2272**	**146**	**393**
W2REH	"	**2,445,048**	**1603**	**141**	**381**
NY2L	"	**2,330,470**	**1640**	**130**	**352**
K2LE	"	1,689,800	1239	130	346
W2VJN	"	1,684,254	1155	141	366
W2GD	"	1,049,846	916	118	295
			(Opr. KU2C)		
W2TZ	"	514,567	761	71	168
K2FL	"	416,292	480	94	213
W2GGE	"	332,985	417	92	189
K2QIL	"	327,366	498	65	169
KX2A	"	308,568	402	96	180
N2AZS	"	306,250	452	78	152
W2FTY	"	217,550	346	73	156
WA2ORX	"	183,065	285	81	154
N2AIF	"	177,840	270	74	166
WA2ASQ	"	168,586	315	60	134
W2AWF	"	112,689	232	49	122
W2DW	"	109,980	230	62	118
W2GKZ	"	109,382	228	62	120
KT2D	"	101,904	220	56	120
N2MR	"	88,500	186	58	119
W2IQB	"	71,189	139	71	123
KW2J	"	67,050	166	53	97
W2KHQ	"	53,328	147	42	90
K2SWZ	"	45,990	140	40	86
W2FUI	"	40,135	152	30	65
WA2UDT	"	28,576	111	31	63
N2FBV	"	28,100	96	13	87
WB2DVU	"	4,900	40	18	32
KK2B	"	3,520	30	16	28
KU2Q	**28**	**46,228**	**178**	**27**	**64**
KA2AEV	"	**35,112**	**172**	**22**	**55**
K2AW	"	15,841	83	21	52
W2KTF	"	4,158	37	14	28
WB2Q	**21**	**280,960**	**762**	**33**	**95**
K2MFY	"	98,645	309	29	80
K3JGJ/2	"	83,980	306	25	70
K2FE	"	32,544	121	22	74
K2SS	**14**	**479,479**	**1136**	**37**	**106**
N2MG	"	304,732	900	33	83
NG2X	"	274,048	737	34	94
W2HPF	"	252,018	742	33	84
W2AYJ	"	50,336	196	24	64
W2FYA	"	15,904	100	15	41
N2DT	**7**	**315,530**	**806**	**35**	**103**
K2DM	"	280,140	712	36	104
K8XR/2	"	143,635	436	31	84
NT2S	"	38,033	181	16	57
KD2RD	**3.5**	**114,760**	**459**	**23**	**72**
N2US	"	9,312	73	14	34
KN2Q	"	3,290	38	10	25
K5NA/2	**1.8**	**17,940**	**121**	**18**	**51**
NA2M	"	2,156	33	11	17
WB2ULI	"	1,560	20	10	16
N2KA	"	1,050	18	10	15
K2PH	"	348	15	5	7
W3GRF	**A**	**3,828,883**	**2512**	**143**	**380**
			(Opr. K8DQ)		
K3TUP	"	**3,363,110**	**2139**	**146**	**396**
			Opr. K5ZD)		
K3LR	"	**2,629,659**	**1722**	**149**	**380**
K3NA	"	2,355,548	1769	130	337
N3AD	"	2,176,697	1722	121	316
N3CXV	"	1,800,162	1439	127	314
K3IPK	"	1,634,919	1338	119	310
KQ3F	"	1,352,736	1193	113	283
K3ZZ	"	1,278,700	1166	111	269
W3UM	"	1,081,905	910	117	298
W3OV	"	744,808	830	95	219
K3WUW	"	607,513	584	109	244
W3UJ	"	496,096	576	90	206
W3FW	"	398,094	527	80	178
W3NZ	"	347,616	412	94	212
W3NX	"	292,400	391	94	178
W3EVW	"	255,024	371	88	176
AA3B	"	248,007	381	70	159
W3HVQ	"	243,600	380	71	161
K3AV	"	224,908	336	70	166
W3GN	"	179,580	269	89	157
W3EAN	"	121,800	253	52	122
K3BSY	"	112,998	345	30	81
N3WW	"	74,620	159	57	107
W3HVM	"	70,518	166	59	102
K3TEJ	"	68,554	179	52	99
N3HW	"	66,555	183	45	90
K3KMO/M	"	60,900	154	45	100
W3QIR	"	52,584	156	57	111
KW3W	"	45,214	164	28	66
W3FGS	"	38,625	138	36	67
WA3FQZ /AE	"	32,851	103	51	82
W3HDH	"	16,380	70	29	55
K3YGU	"	9,450	56	23	40
K3NL	"	7,920	48	28	44
W3FQE	"	3,762	35	15	23
K3WGR	**28**	**18,240**	**109**	**19**	**41**
K3JGJ	**21**	**83,980**	**306**	**25**	**70**
W3KHQ	"	8,556	68	14	32
W3KYN	14	11,040	66	21	39
W8FG/3	**7**	**257,043**	**632**	**38**	**103**
W3AP	"	204,490	577	33	88
N3BNA	**3.5**	**21,846**	**121**	**16**	**50**
K4JLD/3	"	14,796	97	13	41
WB3AVN	**1.8**	**8,320**	**75**	**15**	**37**
K3UA	"	6,144	56	16	32
K3ND	"	1,056	20	8	16
N6AR/4	**A**	**2,507,960**	**1649**	**150**	**380**
W4RX	"	**2,507,115**	**1717**	**146**	**361**
K4PQL	"	**2,330,211**	**1790**	**123**	**324**
WZ4F	"	1,758,708	1368	131	310
W3VT/4	"	1,680,445	1155	148	367
N4KG	"	1,629,994	1155	146	356
N4VZ	"	1,113,927	863	127	326
K4AMC	"	760,240	779	107	233
WZ4Z	"	671,274	626	129	272
K4XO	"	646,352	632	125	273
K4GKD	"	504,243	579	95	218
WB4BBH	"	480,248	504	109	237
W1UA/4	"	479,544	556	107	211
W9LT/4	"	459,780	534	96	220
N4XM	"	429,345	510	105	210
WB4MAI	"	389,610	410	114	237
W6OKX/4	"	377,975	422	104	221
N4TO	"	333,867	371	103	224
K4PB	"	329,896	401	91	210
AA4UJ	"	293,188	401	78	181
WF4G	"	259,740	363	90	170
AA4FF	"	233,981	354	73	166
W4DXI	"	228,864	325	82	174
N4MM	"	226,840	307	85	180
K4EZ	"	222,915	350	69	162
WB4AKE	"	197,396	300	80	164
KC3Z/4	"	174,669	259	85	152
KF4CI	"	173,016	270	79	164
N4PRV	"	126,560	217	74	150
K4OD	"	106,190	217	65	120
N4JF	"	95,850	181	86	127
W4YN	"	94,944	199	59	113
K4BAM	"	91,245	203	58	107
K4KUZ	"	51,294	115	67	99
K4JO	"	41,184	130	39	78
K5OTI/4	"	38,480	109	50	80
NN7A/4	"	34,832	110	37	75
W4OWJ	"	23,220	98	32	58
K4FPF	"	21,315	88	30	57
WS4F	"	20,685	78	37	61
W4KMS	"	20,286	81	37	61
W4JVN	"	13,464	69	23	49
K6ETM/4	"	12,411	75	19	44
N4LJS	"	10,721	65	27	44
K4PR	"	9,125	47	30	43
N4QKG	"	2,886	29	14	23
N4EJW	**28**	**105,369**	**395**	**27**	**76**
K1ZX/4	**21**	**370,800**	**917**	**36**	**108**
WB4TDH	"	278,720	716	32	102
N8GG/4	"	257,544	772	32	94
N4IR	"	162,120	527	27	78
KV4AM	"	25,718	116	25	52
K4CEB	"	15,336	80	23	48
K3RV/4	**14**	**553,415**	**1244**	**39**	**112**
WX4G	"	**463,696**	**1201**	**37**	**109**
N4MO	"	203,980	581	34	90
W4XJ	**7**	**299,482**	**767**	**38**	**99**
K4LTA	"	100,570	327	31	82
W4YE	"	89,139	242	35	94
N6BFM/4	"	37,048	152	28	60
KN4B	"	29,666	115	27	64
WB4IUX	"	28,724	122	25	61
W4NL	**3.5**	**92,055**	**342**	**25**	**70**
KI4UZ	"	21,238	118	20	54
N4WJ	"	20,075	96	18	55
K4TEA	**1.8**	**13,632**	**92**	**20**	**44**
N4SU	"	**9,686**	**66**	**19**	**39**
W4DR	"	4,704	45	15	27
N4UH	"	4,346	46	15	26
N5AU	**A**	**2,463,318**	**1645**	**159**	**363**
			(Opr. WN4KKN)		
AD5Q	"	**762,552**	**779**	**119**	**238**
N5JB	"	692,152	692	121	238
N5TP	"	646,254	516	133	313
NT5G	"	547,027	540	122	255
KI3L/5	"	532,416	693	103	179
N5AW	"	527,276	518	129	257
WA5IGD	"	366,047	437	101	210
WB5ZKR	"	325,888	461	85	171
K5DB	"	277,635	401	83	166
WC5D	"	230,184	316	99	177
NN5T	"	214,368	351	83	148
N5UA	"	212,368	351	83	148
K5FUV	"	208,854	316	87	159
N5HB	"	185,313	307	79	144
N5JEE	"	123,420	237	67	120
W5MW	"	119,579	210	74	123
AA5BT	"	102,087	189	71	128
N5GPP	"	80,685	184	63	102
K5DX	"	73,688	177	52	99
W5NJ	"	60,060	140	57	99
W5HNS	"	39,406	121	52	70
W5JC	"	37,240	98	60	80
W5EJT	"	28,250	91	46	67
K5NV	"	21,150	97	40	54
WB5SSD	"	3,388	29	19	25
W5HRF	"	1,768	21	14	20
K9LA/5	28	13,975	78	22	43
N7RP/5	"	9,858	71	20	33
K5GO	**21**	**451,764**	**1094**	**36**	**105**
W5VX	"	**421,850**	**1009**	**36**	**107**
KA5W	"	323,963	865	32	99
K5TSQ	"	278,652	724	34	98
W5BOS	"	191,646	573	30	87
WD5F	"	92,983	319	32	75
WB5UDX	"	67,996	266	26	63
W5ASP	"	34,144	140	26	62
W5KCR	"	12,663	71	22	41
N5CR	**14**	**408,480**	**946**	**37**	**111**
W5FO	"	245,340	637	37	104
K5MK	"	62,532	206	30	78
K5RR	**7**	**269,698**	**661**	**38**	**105**
			(Opr. WD5K)		
KM5R	"	181,200	526	33	87
WF5E	"	84,564	279	34	74
W5WQN	"	82,340	272	35	80
KN5S	"	4,662	45	12	25
K5RX	**3.5**	**116,584**	**399**	**27**	**77**
KD5IA	"	13,104	89	18	38
K5UR	**1.8**	**28,635**	**148**	**26**	**57**
K9MK/5	"	3,196	46	13	21
W6TMD	**A**	**1,390,350**	**1253**	**138**	**252**
W6GO	"	**1,152,900**	**1136**	**130**	**236**
W6REC	"	**635,268**	**732**	**108**	**209**
W6JTI	"	578,760	669	115	197
N6EK	"	519,684	739	101	153
W6FSJ	"	428,274	525	116	181
K6HIH	"	317,148	505	104	143
N6AN	"	281,980	455	88	142
K6DR	"	247,660	368	98	146
N2UN/6	"	245,105	378	94	141
W6UJX	"	221,598	344	94	140
W6NKR	"	199,800	315	77	145
KS6H	"	194,350	411	93	137
WA7G/6	"	190,080	337	79	119
K6ZUR	"	173,452	310	80	126
K6EID	"	143,792	262	89	120
K6LRN	"	142,662	280	66	111
KG6AQ	"	136,183	272	80	111
W6EJJ	"	123,114	217	81	132
W6ISQ	"	119,730	223	76	119
W6VG	"	113,320	260	60	96
WW6D	"	77,760	228	57	78
N6IC	"	76,038	167	68	106
K6JG	"	66,248	138	74	108
AJ6V	"	61,787	183	62	75
W6ABW	"	61,364	201	53	63
K6YK	"	57,096	165	47	75
K6FO	"	55,522	147	62	80
AC6H	"	55,290	185	47	67
K9AGL/6	"	54,612	170	54	69
N6JM	"	50,215	152	54	67
N6VR	"	50,213	122	62	87
WK6V	"	46,704	155	50	62
W6BZE	"	38,080	118	47	72
N6NF	"	32,218	130	39	50
K6TS	"	29,050	129	30	53
W6MFC	"	29,003	113	44	53
WA8LLY/6	"	28,910	89	47	71
NE6I	"	27,966	90	45	73
AA4Q/6	"	19,135	77	42	47
K6KM	"	18,360	81	34	51
K6CSL	"	18,232	99	44	42
KK6P	"	17,052	64	38	60
W6CN	"	13,396	72	32	36
N6OM	"	12,685	79	21	38
WB6ITM	"	12,684	61	42	42
K6MA	"	6,254	42	26	33
WA6FGV	**28**	**10,388**	**77**	**19**	**34**
WB6MSF	"	4,181	44	15	22
W6QHS	**21**	**212,520**	**609**	**33**	**87**
W6PU	"	200,616	671	29	75
AI6V	"	170,520	601	31	67
K4KTM/6	"	134,820	449	30	77
W6BSY	"	97,552	334	30	74
N6GG	**14**	**260,898**	**668**	**37**	**97**
WA6TLA	"	90,034	288	33	76
W6NNV	"	29,493	119	30	57
W6YA	**7**	**353,829**	**822**	**37**	**110**
KM6B	"	**351,090**	**849**	**38**	**103**
			(Opr. N6AW)		
K5KT/6	"	99,938	328	31	76
N6OC	"	60,264	196	37	71
WB6EGE	1.8	1,080	30	9	9
KE6VL	"	195	18	7	6
KY7M	**A**	**1,575,774**	**1376**	**139**	**287**
K5MM/7	"	**1,478,858**	**1360**	**137**	**242**
N7TT	"	**1,294,554**	**1313**	**129**	**230**
NC7K	"	825,064	978	113	189
K7DZ	"	382,543	558	103	156
NQ7M	"	366,605	563	82	145
K7ABV	"	337,722	493	89	169
W7OF	"	308,940	402	108	177
W7IIT	"	198,880	404	67	109
KS7T	"	186,824	374	75	118
WA7WOC	"	161,364	286	81	123
W7HS	"	160,095	300	76	119
K7RIE	"	159,666	339	73	105
NG7S	"	157,384	283	82	124
W7WHY	"	148,603	329	64	97
K7WK	"	125,172	242	61	122
KX7J	"	114,165	240	68	109
W7MCU	"	107,692	190	96	122
W7QN	"	100,806	232	64	95
KA7T	"	89,847	229	65	84
W7IEU	"	82,144	202	64	87
W7EKM	"	79,089	224	54	69
W7ZR	"	71,832	137	90	129
N7HUS	"	62,748	205	45	63
W7CMO	"	55,645	136	57	98
W7TWL	"	51,290	183	56	59
KS7P	"	42,315	161	29	62
W7NEJ	"	37,442	134	37	60
W7GUR	"	32,918	114	49	60
K7IDX	"	31,930	113	36	67
K7CU	"	23,930	92	33	57
KA7FEF	"	20,448	111	30	41
K7EFB	"	11,058	69	24	33
N7JB	"	10,738	63	23	36
N7EPD	"	6,981	64	18	21
K7QQ	**28**	**37,944**	**261**	**26**	**42**
KQ7I	"	15,704	111	20	32
AI7B	**21**	**201,705**	**658**	**33**	**72**
N7RO	"	123,785	464	29	66
W7TJ	"	116,178	401	34	68
W7LGG	"	20,513	101	27	46
KN7K	"	20,060	107	27	41
NZ7Q	"	19,552	136	17	35
NN7L	**14**	**367,964**	**970**	**36**	**98**
NX7K	"	219,626	567	37	97
KR7G	"	185,832	554	35	81
WA7BPI	"	177,117	475	36	93
WA7GVM	"	129,470	405	33	77
W7LVI	"	42,822	186	23	55
W6ALQ/7	"	34,719	189	24	47
W7AYY	"	30,600	151	23	49
W7VIH	"	1,050	29	7	7
W7EJ	**7**	**234,549**	**673**	**35**	**84**
W7ZMD	"	24,012	126	26	61
K7WA	"	2,960	54	10	10
W7ZI	3.5	5,544	64	13	20
W7KKR	"	1,431	26	11	16
K7DX	**1.8**	**2,800**	**48**	**11**	**14**
K7SP	"	1,809	31	12	15
K8CC	**A**	**2,089,519**	**1587**	**136**	**327**
KE8M	"	**416,670**	**518**	**93**	**192**
W8RSW	"	338,830	386	96	214
N8BC	"	274,896	399	77	172
KA8JZR	"	224,352	340	79	167
W8FN	"	201,140	313	75	151
K8QWY	"	177,731	285	77	146
KF8K	"	174,244	263	83	171
W8GOC	"	173,998	266	80	162
K8OQL	"	134,540	230	67	150
K4FW/8	"	116,802	267	69	120
K8CV	"	113,457	229	60	117
K8EF	"	101,711	207	73	120
W8YGR	"	100,200	195	68	132
WB8YJF	"	79,952	191	51	101
W8JRK	"	73,304	164	54	100
W8UPH	"	72,336	196	45	92
KB8FJ	"	43,456	153	28	69
WA8IGG	"	41,280	127	43	77
N8FU	"	41,168	130	49	75
NC8V	"	16,132	77	23	51
N8MK	"	11,985	56	32	53
WB8SFF	"	8,631	50	22	41
WD8AUB	**21**	**274,932**	**748**	**31**	**95**
W8WVU	"	64,505	236	25	72
W8IQ	"	52,250	207	25	70
KA8DJZ	"	31,084	141	21	55
KS8S	**14**	**508,950**	**1204**	**34**	**111**
			(Opr. KU8E)		
WD8LLD	"	306,195	775	37	100
WA8YTM	"	61,382	234	24	70
W8UMR	"	55,554	209	25	69
K8MFO	**7**	**261,648**	**581**	**39**	**119**

HF Equipment	Regular	SALE
IC-781 Xcvr/Rcvr/ps/tuner/scope ...	5995.00	Call

IC-761 Xcvr/Rcvr/ps/tuner	2699.00	2369
HM-36 Scanning hand microphone	47.00	
SP-20 Ext. speaker w/audio filter ..	149.00	139.95
FL-101 250 Hz 1st IF CW filter	73.50	
FL-53A 250 Hz 2nd IF CW filter	115.00	109.95
FL-102 6 kHz AM filter	59.00	
EX-310 Voice synthesizer.....	59.00	

IC-751A 9-band xcvr/.1-30 MHz rcvr	1699.00	1469
PS-35 Internal power supply	219.00	199.95
FL-32A 500 Hz CW filter (1st IF)....	69.00	
FL-63A 250 Hz CW filter (1st IF)....	59.00	
FL-52A 500 Hz CW filter (2nd IF)...	115.00	109.95
FL-53A 250 Hz CW filter (2nd IF)...	115.00	109.95
FL-33 AM filter.....	49.00	
FL-70 2.8 kHz wide SSB filter	59.00	
RC-10 External frequency controller	49.00	

IC-735 HF transceiver/SW rcvr/mic	1099.00	959.95
PS-55 External power supply.....	219.00	199.95
AT-150 Automatic antenna tuner ...	445.00	369.95
FL-32A 500 Hz CW filter	69.00	
EX-243 Electronic keyer unit	64.50	
UT-30 Tone encoder	18.50	

Other Accessories	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	1699
PS-15 20A external power supply.....	175.00	159.95
PS-30 Systems p/s w/cord, 6-pin plug	349.00	319.95
MB Mobile mount, 735/751A/761A...	25.99	
SP-3 External speaker	65.00	
SP-7 Small external speaker	51.99	
CR-64 High stab. ref. xtal for 751A....	79.00	
PP-1 Speaker/patch.....	179.00	164.95
SM-6 Desk microphone	47.95	
SM-8 Desk mic - two cables, Scan.....	89.00	
SM-10 Compressor/graph EQ, 8 pin mic	149.00	139.95
AT-100 100W 8-band auto. antenna tuner	445.00	389.95
AT-500 500W 9-band auto. antenna tuner	589.00	519.95
AH-2 8-band tuner w/mount & whip	659.00	589.95
AH-2A Antenna tuner system, only....	519.00	449.95
GC-5 World clock	91.95	79.95

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VHF/UHF base multi-modes	Regular	SALE
IC-275A 25W 2m FM/SSB/CW w/ps	1299.00	1149
IC-275H 100W 2m FM/SSB/CW.....	1399.00	1229
IC-375A 25W 220 FM/SSB/CW.....	1399.00	1099
IC-475A 25W 440 FM/SSB/CW w/ps	1399.00	1099
IC-475H 75W 440 FM/SSB/CW.....	1599.00	1289
IC-575A 25W 6/10m xcvr w/ps	1399.00	1249

IC-471H 75W 430-450 ..... **Closeout**	1399.00	989.95
PS-35 Internal power supply	219.00	199.95
AG-35 Mast mounted preamp	99.95	
AG-35 (Purchased with IC-471H)	99.95	9.95
SM-6 Desk microphone	47.95	
EX-310 Voice synthesizer	59.00	
TS-32 CommSpec encode/decoder....	59.95	
UT-15 Encoder/decoder interface...	34.00	
UT-15S UT-15S w/TS-32 installed.....	96.00	

VHF/UHF/1.2 GHz Mobiles	Regular	SALE
IC-37A 25w 220 FM/TTP mic **Closeout**	499.00	349.95
IC-47A 25w 440 FM/TTP mic **Closeout**	549.00	399.95
PS-45 Compact 8A power supply ...	145.00	134.95
UT-16/EX-388 Voice synthesizer ...	34.99	
SP-10 Slim-line external speaker ...	35.99	
IC-28H 45W 2m FM, **TTP** mic	499.00	439.95
IC-38A 25W 220 FM, regular mic	459.00	349.95
IC-38A 25W 220 FM, **TTP** mic	489.00	389.95
IC-48A 25W 440-450 FM, regular mic	459.00	369.95
IC-48A 25W 440-450 FM, **TTP** mic....	509.00	449.95
HM-14 Extra TTP microphone	59.00	
UT-28 Digital code squelch.....	39.50	
UT-29 Tone squelch decoder	46.00	
HM-16 Speaker/microphone	34.00	
IC-228A 25W 2m FM/TTP scan mic...	509.00	449.95
IC-228H 45W 2m FM/TTP scan mic...	539.00	479.95
UT-40 Pocket beep function.....	45.00	
IC-900A Transceiver controller.....	639.00	569.95
UX-19A 10m 10W band unit	299.00	269.95
UX-29A 2m 25W band unit.....	299.00	269.95
UX-29H 2m 45W band unit.....	349.00	319.95
UX-39A 220MHz 25W band unit....	349.00	289.95
UX-49A 440MHz 25W band unit....	349.00	319.95
UX-59A 6m 10W unit	349.00	319.95
UX-129A 1.2GHz 10W band unit ...	549.00	499.95
IC-1200A 10W 1.2GHz FM Mobile.....	699.00	549.95
IC-3200A 25W 2m/440 FM w/TTP....	695.00	529.95
UT-23 Voice synthesizer.....	34.99	
AH-32 2m/440 Dual Band antenna ...	39.00	
AHB-32 Trunk-lip mount	35.00	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount....	22.00	
Larsen PO-MM Magnetic mount	22.00	
RP-1210 1.2GHz 10W 99 ch FM xcvr	1529.00	1349
RP-2210 220MHz 25W repeater	1649.00	1469
RP-3010 440MHz 10W FM repeater...	1299.00	1149

Due to the size of the ICOM product line, some accessory items are not listed. If you have a question, please call. All prices shown are subject to change without notice.

MasterCard VISA

Hand-helds	Regular	SALE
IC-2A 2-meters.....	289.00	259.95
IC-2AT with TTP.....	319.00	279.95
IC-3AT 220 MHz, TTP	349.00	299.95
IC-4AT 440 MHz, TTP	349.00	299.95
IC-02AT/High Power	409.00	349.95
IC-03AT for 220 MHz	449.00	349.95
IC-04AT for 440 MHz	449.00	389.95
IC-u2AT for 2m w/TTP	329.00	289.95
IC-u4AT 440 MHz, TTP	369.00	299.95
IC-2GAT for 2m, TTP	429.00	379.95
IC-4GAT 440MHz, TTP	449.00	399.95
IC-32AT 2m/440MHz	629.00	559.95

IC-u2A for 2m **w/o TTP**
Reg. $299 - **Closeout $249.95**

Aircraft band handhelds	Regular	SALE
IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	473.00	369.95
A-2 5W PEP synth. aircraft HT.....	525.00	479.95
A-20 Synth. aircraft HT w/VOR.....	625.00	569.95

Accessories for all except micros	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	79.00
BP-8 800mah/8.4V Nicad Pak - use BC-35...	79.00
BC-35 Drop in desk charger for all batteries	79.00
BC-16U Wall charger for BP7/BP8.....	21.25
LC-11 Vinyl case for Dlx using BP-3	20.50
LC-14 Vinyl case for Dlx using BP-7/8	20.50
LC-02AT Leather case for Dlx models w/BP-7/8	54.50

Accessories for IC and IC-O series	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35....	49.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	39.50
BP-4 Alkaline battery case.....	16.00
BP-5 425mah/10.8V Nicad Pak - use BC35	65.00
CA-5 5/8-wave telescoping 2m antenna	19.95
CP-1 Cig. lighter plug/cord for BP3 or Dlx....	13.65
CP-10 Battery separation cable w/clip.....	22.50
DC-1 DC operation pak for standard models	24.50
MB-16D Mobile mtg. bkt for all HTs.....	25.99
LC-2AT Leather case for standard models.....	54.50
RB-1 Vinyl waterproof radio bag.....	35.95
HM-9 Speaker microphone.....	47.00
HS-10 Boom microphone/headset.....	24.50
HS-10SA Vox unit for HS-10 & Deluxe only	24.50
HS-10SB PTT unit for HS-10.....	24.50
SS-32SMP Commspec 32-tone encoder	27.95

For other HT Accessories not listed please CALL

Receivers	Regular	SALE
R-71A 100kHz to 30MHz receiver.....	$999.00	869.95
RC-11 Infrared remote controller....	70.99	
FL-32A 500 Hz CW filter	69.00	
FL-63A 250 Hz CW filter (1st IF)	59.00	
FL-44A SSB filter (2nd IF).....	178.00	159.95
EX-257 FM unit.....	49.00	
EX-310 Voice synthesizer	59.00	
CR-64 High stability oscillator xtal	79.00	
SP-3 External speaker.....	65.00	
CK-70 (EX-299) 12V DC option.....	12.99	
MB-12 Mobile mount	25.99	
R-7000 25MHz to 2GHz scan rcvr	1199.00	1049
RC-12 Infrared remote controller....	70.99	
EX-310 Voice synthesizer	59.00	
TV-R7000 ATV unit.....	139.00	129.95
AH-7000 Radiating antenna	99.00	

(14)

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WB3KKX /8	"	240,030	634	36	99
W8CAR	"	8,008	59	18	34
WB8JBM	**3.5**	**120,420**	**392**	**27**	**81**
			(Opr. NZ4K)		
W8UVZ	"	95,676	339	28	74
K8DD	"	19,800	113	19	47
N8EA	**1.8**	**4,563**	**59**	**13**	**26**
W9RE	**A**	**2,957,682**	**1868**	**157**	**389**
			(Opr. WA8YVR)		
N9NS	**"**	**549,926**	**616**	**113**	**225**
W9OP	"	525,192	605	104	212
NA9J	"	425,522	554	92	182
K9UIY	"	342,912	457	94	188
WB9HRO	"	308,005	419	87	182
W9GXR	"	231,840	400	69	138
AG9S	"	153,438	266	77	137
K9OSH	"	119,988	233	74	124
W9HE	"	82,485	215	46	89
NG9L	"	67,760	185	45	95
W9CA	"	30,525	97	35	76
NJ9Z	"	28,600	104	42	68
W9LNQ	"	7,372	40	39	37
W9YCV	"	3,600	29	21	27
W9REC	"	2,800	32	23	27
N9RD	**28**	**27,158**	**141**	**19**	**55**
K9QVB	**21**	**196,467**	**524**	**33**	**96**
W9YSX	**"**	**186,461**	**538**	**30**	**91**
W9OF	"	84,637	262	31	82
KC9T	**14**	**281,029**	**735**	**35**	**98**
N9AEJ	"	138,030	446	29	78
K9CAN	"	137,516	381	33	91
K9UQN	"	5,640	50	9	31
WA9TZE	"	5,000	45	18	22
KK9V	**7**	**235,438**	**606**	**34**	**100**
K9RS	"	211,820	527	37	103
WB9POH	"	181,229	513	35	92
N4TZ/9	"	132,300	351	38	97
N4CC/9	"	124,206	341	36	91
K9IKP	"	45,276	167	33	65
K9FN	"	11,323	63	21	46
WA9MAG	"	9,238	55	19	43
K9RA	**3.5**	**54,897**	**231**	**23**	**64**
W9WAQ	"	50,964	200	25	68
W9RN	"	48,981	208	25	62
KE9U	"	28,684	147	21	50
WB9HAD	**1.8**	**24,382**	**127**	**22**	**51**
WB9NSZ	"	8,094	60	20	37
W9YYG	"	3,552	47	14	23
KQ9L	"	3,240	42	14	22
KØRF	**A**	**1,976,620**	**1533**	**147**	**313**
			(Opr. WØUA)		
WØWP	**"**	**1,268,630**	**1072**	**132**	**286**
KMØL	"	888,140	893	120	247
KJØH	"	656,978	709	111	223
KØUK	"	364,806	540	90	144
WØEJ	"	336,441	458	97	162
WØRXL	"	308,751	399	106	185
NIØG	"	184,064	276	87	169
WØRT	"	158,400	247	83	157
NSØB	"	138,580	257	75	130
KEØY	"	74,568	173	66	90
KFØT	"	71,292	180	60	96
NØGQB	"	57,226	157	52	90
KFØZ	"	35,970	125	39	71
WØNGB	"	34,553	132	45	64
NØFFZ	"	19,635	93	35	42
KØGT	"	12,012	58	32	46
KØZX	**21**	**227,448**	**687**	**32**	**85**
KVØQ	**7**	**250,668**	**659**	**36**	**96**
K9AY/Ø	"	51,775	194	31	64
ABØP	"	20,935	97	26	53
KØKX	**3.5**	**87,044**	**322**	**26**	**68**
WØUO	"	41,748	212	21	50
WØZV	**1.8**	**18,054**	**123**	**21**	**38**
NXØI	"	4,040	44	15	25

BAHAMAS

N4RP/C6A	**A**	**506,684**	**1186**	**68**	**129**

BARBADOS

8P9HT	**A**	**4,429,824**	**4385**	**111**	**301**
			(Opr. K4BAI)		
8P9EL	**14**	**911,400**	**2374**	**38**	**109**
			(Opr. K2SX)		

BELIZE

V31EA	**A**	**394,250**	**965**	**72**	**118**
			(Opr. K6BWX)		

CANADA

VE1ASJ	**A**	**2,470,105**	**2137**	**125**	**337**
VO1MP	"	1,682,415	1923	81	246
VO1AW	"	7,680	42	24	40
VO1QU	**14**	**574,990**	**1677**	**34**	**96**
VE2AYU	**A**	**847,600**	**1020**	**95**	**230**
VE2FFE	"	13,248	75	26	43
VE2ZP	**14**	**334,660**	**1081**	**30**	**86**
VE6OU/3	**A**	**2,117,920**	**1737**	**145**	**343**
VE3IY	**"**	**2,060,180**	**1959**	**133**	**298**
VE3KP	"	869,880	1336	87	177
VE3XN	"	623,278	698	120	238
VE3NBE	"	147,000	282	71	129
VE3NXQ	"	100,130	267	62	108
VE3TEE	"	17,570	116	28	42
VE3OMU	"	280	8	6	8
VE2AEJ/3	**28**	**16,854**	**147**	**19**	**34**
VE3INQ	**1.8**	**25,696**	**297**	**16**	**28**
VE3PN	"	9,750	190	8	18
VE4AEX	**A**	**125,395**	**342**	**61**	**94**
VE6AXB	**"**	**117,044**	**455**	**52**	**64**
VE6DZ	"	110,502	366	57	64
VE6APN	**21**	**54,318**	**364**	**25**	**41**
VE6LQ	**3.5**	**13,680**	**188**	**15**	**21**
VE7DLM	**A**	**507,672**	**1121**	**82**	**116**
VE7WO	"	410,182	629	104	137
VE7HDX	"	204,996	672	64	68
VE7CXR	**21**	**57,672**	**486**	**23**	**31**
VE8CDX	**A**	**198,100**	**611**	**52**	**88**

COSTA RICA

TI2CCC	**28**	**183,092**	**889**	**24**	**67**
TE4T	**1.8**	**4,608**	**143**	**9**	**7**
			(Opr. TI4SU)		

DOMINICAN REPUBLIC

N2BA/HI8	**21**	**367,968**	**1631**	**26**	**70**
HI8LC	**3.5**	**12,132**	**159**	**10**	**26**

GREENLAND

OX3KD	**A**	**161,838**	**690**	**42**	**69**

HONDURAS

HR1AT	**14**	**19,795**	**261**	**15**	**22**

MARTINIQUE

FM5ES	**7**	**335,844**	**1312**	**33**	**81**

MEXICO

XE2MX	**A**	**1,785,470**	**2568**	**113**	**192**
			(Opr. K6NA)		
XE1VV	"	726,138	1520	85	141
XE1GCK	"	88,608	376	48	56
			(Opr. AA6EE)		
XE1FUX	**7**	**548,977**	**1893**	**34**	**87**
			(Opr. K9VV)		

MONTSERRAT

VP2MU	**A**	**4,797,732**	**3771**	**125**	**373**
			(Opr. K8GL)		

PUERTO RICO

NP4A	**A**	**7,247,449**	**5382**	**140**	**394**
			(Opr. N2NT)		

SAN ANDREAS

N3JT/HKØ	**A**	**2,875,839**	**3917**	**92**	**229**

SINT MAARTEN

PJ7X	**A**	**2,497,440**	**3102**	**93**	**237**
			(Opr. KF1V)		

UNITED NATIONS

4U1UN	**A**	**2,470,032**	**3490**	**94**	**212**
			(Opr. NJ2L)		

AFRICA

CANARY ISLANDS

EA8XS	**A**	**6,162,093**	**4689**	**118**	**323**
			(Opr. OH5XT)		
EA8BIE	"	330,072	548	55	149
EA8ABR	"	102,060	317	35	73
EA8BLC	"	50,094	249	19	50
EA8ID	**14**	**1,212,384**	**2336**	**39**	**134**
			(Opr. DK3GI)		

CAPE VERDE ISLANDS

D44BC	**A**	**7,384,104**	**4916**	**136**	**368**
			(Opr. N6TJ)		

DJIBOUTI

J28EO	**A**	**800,800**	**989**	**86**	**189**
J28CY	"	120,981	284	51	96

EGYPT

PA3AXU /SU	**A**	**11,342**	**83**	**17**	**32**

GABON

TR1G	**A**	**2,010,970**	**2183**	**99**	**211**
			(Opr. TR8JLD)		

LIBERIA

5L7U	**A**	**6,121,080**	**4200**	**141**	**349**
			(Opr. OH2KI)		

MADEIRA ISLANDS

CR9BZ	**A**	**6,508,205**	**4447**	**123**	**358**
			(Opr. OHØXX)		
CT3CU	**"**	**1,018,170**	**1404**	**69**	**174**
CT3DJ	"	6,708	45	20	32

MOROCCO

CN8FC	**A**	**146,561**	**443**	**42**	**71**
			(Opr. WA4UAZ)		

NIGERIA

JG1FVZ /5NØ	3.5	11,780	106	12	26

REPUBLIC OF SOUTH AFRICA

ZS6BSZ	**A**	**1,008,730**	**1149**	**99**	**199**
ZS1VP	"	485,970	838	64	130
ZS5BA	"	33,222	103	47	51
ZS4WD	"	27,004	111	38	48
ZS6BCR	**21**	**989,820**	**2458**	**34**	**101**

SEYCHELLES

S79D	**A**	**17,328**	**82**	**33**	**43**

SIERRA LEONE

9L1GG	**7**	**86,337**	**545**	**16**	**37**

SUDAN

PAØGAM /ST2	**A**	**422,592**	**766**	**53**	**133**

TANZANIA

5H1HK	**A**	**3,213,756**	**3082**	**111**	**240**
			(Opr. WH6X)		
5H3BH	**21**	**1,098,810**	**2542**	**38**	**107**
			(Opr. SMØAJU)		

TRISTAN DA CUNHA

ZD9CM	**A**	**87,009**	**300**	**32**	**65**
			(Opr. KYØT)		

ZAIRE

9Q5NW	**A**	**7,586,300**	**4768**	**150**	**385**
			(Opr. N6AA)		
9Q5DA	**28**	**229,437**	**742**	**29**	**82**

ZAMBIA

9J2EZ	**A**	**1,012,290**	**1420**	**75**	**171**

ASIA

BRITISH CYPRUS

ZC4EE	**A**	**962,476**	**1224**	**75**	**209**
ZC4DX	**3.5**	**430,560**	**1318**	**29**	**88**
			(Opr. 4Z4DX)		

CYPRUS

5B4TI	**A**	**5,816,907**	**3949**	**126**	**387**
			(Opr. N6ZZ)		

HONG KONG

VS6TQ	**A**	**172,985**	**685**	**64**	**81**
VS6UP	**28**	**95,025**	**711**	**21**	**54**

INDIA

VU2TJW	**A**	**1,167,680**	**1472**	**110**	**218**
VU2TTC	"	530,670	803	96	189
VU2REC	"	122,720	463	32	72
			(Opr. VU2PTT)		
VU2Z	**28**	**230,338**	**812**	**27**	**79**
			(Opr. VU2ZAP)		
VU2JN	"	12,831	127	17	30
VU2N	**14**	**65,520**	**285**	**23**	**57**

ISRAEL

4Z4RG	**A**	**922,986**	**1174**	**81**	**201**
W3FYT/4X	28	8,178	105	7	22

JAPAN

JA1XAF	**A**	**1,742,580**	**1514**	**151**	**269**
JF1EQA	**"**	**1,563,144**	**1456**	**133**	**249**
JN1AIF	**"**	**1,121,456**	**1268**	**121**	**202**
JA1NUT	"	489,580	676	94	166
JF1PUW	"	442,860	536	119	186
JR1IJV	"	386,697	563	102	147
JH1QDB	"	256,275	452	74	127
JL1ARF	"	231,804	322	107	167
JE1AER	"	190,260	390	66	114
JA1QOW	"	108,721	241	68	95
JG1UZD	"	68,864	215	55	73
JA1WYQ	"	56,548	187	46	73
JA1OJZ	"	47,320	141	59	71
JA1KI	"	46,863	157	54	69
JF1JAX	"	30,272	124	37	51
JS1OSP/1	"	29,580	139	36	49
JA1BNW	"	25,974	90	52	59
JH1NSD	"	18,316	102	37	39
JA1LDJ	"	15,614	81	30	44
JA1EL	"	3,960	38	19	25
JG1RDV	"	870	33	16	14
JK1REJ	"	336	8	7	7
JH5GHM/1	**28**	**52,700**	**237**	**27**	**58**
JH1SJN	"	14,101	97	24	35
JA1MVK	"	12,608	76	26	38
JM1SMY	"	12,600	88	22	34
JA1QZC	"	2,523	34	13	16
JH1OHZ	"	231	10	6	5
JH1ADR	"	120	6	4	6
JA1YWX	**21**	**391,152**	**1189**	**35**	**81**
			(Opr. JO1BMV)		
JH1AEP	**"**	**290,375**	**899**	**36**	**79**
JA1YAG	"	143,406	566	30	63
			(Opr. JHØSPE)		
JO1QUB	"	61,576	268	31	55
JA1YWG	"	31,168	180	24	40
			(Opr. JG2TSL)		
JA1EMQ	"	26,197	141	23	44
JI1CQA	"	24,806	116	30	49
JA1JGP	"	21,186	117	25	41
JK1OXU	"	15,939	86	26	43
JA1QKW	"	9,102	87	18	23
JA1GPP	"	7,215	82	17	20
JA1BFN	"	7,076	123	25	33
JH1BUB	"	5,920	61	15	22
JH1AOU	"	4,142	49	15	23
JA1WOW	"	3,584	42	15	18
JS1MIG	"	570	20	7	8
JI1JCN	"	180	12	5	3
JA1BWA	**14**	**428,472**	**1132**	**37**	**95**
JR1XFS	**"**	**223,740**	**693**	**37**	**76**
JF1SEK	"	75,270	331	29	49
JA1AZS	"	20,368	141	26	41
JA1JBP	"	16,531	95	24	37
JA1BUI	"	14,768	106	21	31
JA1YAG	"	7,728	66	16	30
			(Opr. JG2CEZ)		
JO1QZI	"	5,254	56	15	22
JA1KKA	"	648	12	8	10
JA1LRP	"	288	24	8	4
JH1GTV	**7**	**140,910**	**456**	**33**	**77**
JH1RFM	**"**	**121,980**	**415**	**33**	**74**
JA1YWG	"	51,120	236	29	51
			(Opr. JJ1VRO)		
JA1BUN	"	10,800	79	20	30
JA1NYV	"	1,197	23	10	11
JA1XCI	"	84	7	2	1
JH1RES	**3.5**	**75,715**	**287**	**29**	**66**
JA1OND	"	51,428	235	27	59
JE1CKA	"	42,742	226	25	46
JA1GO	"	8,424	63	19	35
JA1SJV	"	6,804	56	16	26
JR1RCQ	"	3,993	50	15	18
JR1EBE	**1.8**	**5,508**	**71**	**16**	**18**
JE1SPY	"	1,037	28	8	9
JA2EU	**A**	**688,055**	**1074**	**94**	**147**
JA2WZ	"	53,550	240	39	51
JA2BNN	"	18,150	98	32	43
JE2BOM	"	14,271	73	30	41
JG2LGM	"	13,545	108	19	26
JA2IVY	**28**	**31,955**	**164**	**29**	**48**
JH2KKW	"	24,702	150	27	42
JR2BPV	"	20,412	135	25	38
JA2IU	**21**	**89,262**	**391**	**33**	**54**
JH2BCN	"	70,380	297	32	58
JJ2FJM	"	25,480	172	23	33
JR2IGV	"	15,900	101	20	40
JL2AQX	"	14,820	95	21	36
JI2DLF	**14**	**73,372**	**327**	**28**	**55**
JF2UOP	"	37,060	160	28	57
JA2KPV	"	18,150	111	22	44
JR2ASX	"	12,397	99	21	28
JA2IVK	3.5	18,582	128	22	35
JE2LPC	"	7,257	74	17	24
JA2ODS	1.8	387	18	5	4
JR3BOT	**A**	**622,790**	**911**	**91**	**154**
JF3CCN	**"**	**493,265**	**780**	**95**	**140**
JR3WXA	"	309,778	533	85	133
JH3JYS	"	86,618	212	62	99
JR3XEX	"	61,376	184	51	86
JA3ARM	"	47,740	176	44	66
JA3UWB	"	25,425	128	31	44
JG3EHD	"	3,366	55	14	8
JH3AIU	28	7,535	62	22	33
JA3AYX	"	231	8	5	6
JA3YDS	**21**	**121,485**	**483**	**31**	**60**
			(Opr. JI3GAB)		
JG3QCW	"	88,100	318	33	67
JF3UMP	"	76,100	287	33	67
JR3NZC	**14**	**90,000**	**396**	**29**	**51**
JA5UBW /3	"	12,825	100	20	25
JE3CYH	"	5,805	49	17	26
JI3AUD	**7**	**8,400**	**85**	**17**	**23**
JA3FYC	**1.8**	**1,896**	**36**	**12**	**12**
JA3BCT	"	525	16	7	8
JE4CIL	**A**	**215,682**	**409**	**75**	**131**
JH4NMT	"	90,200	225	76	88
JH4OYA	"	59,624	219	49	67
JA4RWN	"	24,640	114	42	46
JA4FMS	"	19,926	104	41	41
JA4EE	"	12,028	74	31	31
JA4ATV	"	4,342	19	14	16
JA4AQR	"	3,570	36	17	18
JR4THU	"	2,574	39	9	13
JA4CUU	28	3,510	35	18	21
JA1XCZ/4	"	3,016	45	13	16
JR4ISK	**21**	**35,490**	**182**	**28**	**50**
JE4VRF	"	31,500	185	23	46
JF4FUF	"	9,553	82	15	26
JR4CAU	"	9,169	84	21	32
JA4OPW	"	6,930	61	18	24
JE4QJP	"	3,570	37	13	21
JE4VVM	**3.5**	**57,642**	**291**	**26**	**52**
JA5DQH	**A**	**1,894,644**	**1463**	**166**	**311**
JA5AF	"	3,549	42	17	22
JR5JAQ	**21**	**130,795**	**467**	**33**	**68**
JA5BQX	14	36,210	190	22	49
JA5PDS	"	1,742	36	10	16
JR5MYC	**3.5**	**18,135**	**106**	**23**	**42**
JE6JRY	**A**	**514,083**	**1653**	**110**	**201**
JH6TYD	"	138,367	321	79	100
JI6HRW	"	70,448	220	50	69
JA6AKV	"	37,128	156	37	54
JF6JQM	"	34,230	121	43	62
JF6KAC	"	28,405	110	39	56
JA6HJP	"	22,692	104	35	58
JA6JVY	"	12,430	82	24	31
JH6IOM	"	10,530	66	28	37
JR6CF	"	6,393	41	28	35
JH6WHN	**28**	**16,524**	**118**	**26**	**42**
JA6YCU	**21**	**97,438**	**401**	**30**	**56**
			(Opr. JE6UWK)		
JF6DSZ	"	87,440	388	26	54
JF6MIT	"	7,585	75	16	21
JA6QDU	"	336	15	4	4
JA6YFL	**14**	**101,412**	**366**	**33**	**75**
JA6NKZ	"	15,390	106	22	35
JA6PN	3.5	2,850	41	12	18
JA6GCE	"	312	17	7	6
JH7LVK	**A**	**1,303,743**	**1392**	**131**	**212**
JA7MAD	"	238,388	365	108	136
JA7SUR	"	188,235	470	61	80
JA7JHT	"	145,080	309	72	108
JA7AS	"	105,252	283	63	84
JA7BE	"	105,248	235	77	107
JH7BMF	"	50,244	186	46	60
JA7ASD	"	42,389	164	44	53
JH7CJM	"	20,160	80	33	51
JA7AXP	"	8,056	56	21	32
JG7JBZ	"	5,904	56	24	24
JH7XGN	**28**	**13,144**	**95**	**21**	**32**
JH8FAJ/7	"	9,430	86	17	24
JF7IDT	"	2,580	36	13	17
JA7OYM	21	4,761	69	11	12
JA7FTR	**14**	**407,543**	**1127**	**38**	**89**
JA7MYQ	"	84,252	291	32	70
JR7CDL	"	67,248	340	24	48
JH7QXJ	"	38,304	216	23	40
JA7AZJ	"	19,951	99	28	43
JA7DYM	"	18,849	105	26	35
JH7BRG	"	12,265	80	20	35
JA7HMZ	**7**	**477,450**	**1134**	**40**	**110**
JA7FWR	**3.5**	**26,352**	**181**	**19**	**35**
JA7JWF	"	24,896	147	24	40
JA8RWU	**A**	**1,269,996**	**1302**	**134**	**230**
JA8KSD	"	504,546	641	111	182
JA8AJE	"	111,132	280	66	81
JA8EJO	"	72,720	203	58	86
JE1KDM/8	"	6,120	56	22	23
JH8YCT	**21**	**224,126**	**827**	**34**	**64**
			(Opr. JE8BFO)		
JE8TRU	"	16,848	124	23	29
JA8YTT	"	7,995	87	16	25
			(Opr. JA4-8649/8)		
JE8KKX	"	4,674	49	17	21
JE8PFJ	**7**	**72,590**	**301**	**32**	**53**
JR8JTO	"	17,920	107	22	42
JA9CWJ	**A**	**331,683**	**585**	**83**	**126**
JA9RYL	"	32,025	105	42	63
JA9PBZ	"	18,081	97	29	34
JA9RPU	**28**	**62,744**	**288**	**30**	**58**
JH9KVF	**21**	**45,600**	**233**	**28**	**45**
JA9NFO	**14**	**115,072**	**359**	**36**	**80**
JA9HU	7	360	12	4	6
JAØEZP	**A**	**239,456**	**398**	**85**	**139**
JAØNCE	"	55,418	182	54	67
JRØBQD	"	49,290	215	43	63
JAØBR	"	24,696	134	38	46
JRØGAS	"	11,960	84	29	36
JAØGZ	"	3,600	34	21	24
JAØTHQ	"	741	14	9	10
JHØBLI	21	30,814	169	26	45
JAØVUJ	"	23,220	133	23	37
JAØQNJ	"	14,280	100	18	33
JHØUQI	"	7,954	72	17	24
JRØRBY	"	6,665	69	17	25
JHØHON	"	6,272	74	19	13
JAØCGJ	14	33,852	156	28	50
JAØUMV	**7**	**77,736**	**343**	**28**	**54**
JAØKAZ	"	55,640	208	34	70
JRØNKU	"	1,938	58	14	24
JAØDXG	**3.5**	**77,770**	**374**	**26**	**51**

JORDAN

JY5DP	14	10,864	70	17	39

KOREA

HL1XP	**A**	**87,091**	**371**	**50**	**59**
HL9CA	21	13,216	99	20	36
HL1LW	**14**	**80,432**	**419**	**29**	**59**
HL9EP	"	43,197	318	24	27

SINGAPORE

9V1XE	**A**	**856,745**	**1686**	**112**	**193**

SAUDI ARABIA

HZ1HZ	**A**	**2,181,480**	**1939**	**113**	**279**

SYRIA

OF6XY/4U	**7**	**379,891**	**1619**	**19**	**64**

TURKEY

TA1KA/2	A	2,232,819	2144	100	269

WEST MALAYSIA

9M2AX	A	20,064	119	42	46

U.S.S.R. ASIATIC

ARMENIA

UG6GRA	28	20,904	182	10	29
UG6GGG	21	65,455	433	15	38
UG6GG	14	237,838	814	32	77
UG6GAW	1.8	103,016	498	18	61

ASIATIC RUSSIA

UA9YI	A	1,779,954	1555	125	322
RA9JX	"	701,811	1093	84	213
UA9HTT	"	497,290	871	68	155
UA9XS	"	267,852	494	50	154
UA9XHJ	"	230,044	462	71	128
RA9FA	"	157,860	404	56	124
UV9CC	"	122,120	280	52	120
RA9UNR	"	93,932	466	27	65
UA9YAD	"	55,627	227	34	109
UA9WZ	"	51,310	276	15	55
UW9AU	"	48,900	183	37	63
UA9YJQ	"	35,200	140	39	71
UW9CZ	"	32,604	171	22	56
UA9URF	"	18,224	131	26	42
RA9AE	"	15,480	103	27	45
UA9NP	"	12,025	80	23	42
RA9YG	28	154,521	651	29	68
UA9QA	"	37,944	213	25	47
UA9LCU	"	9,976	124	10	19
UA9FGO	"	9,856	110	13	31
UA9QBT	"	6,840	71	13	25
UA9AOV	"	2,542	34	9	22
UA9KK	21	88,938	505	26	55
UA9ULC	"	76,896	397	24	65
UA9UON	"	67,878	422	23	58
UW9YM	"	61,268	442	23	45
UA9XHT	14	95,508	425	23	61
UA9SFV	"	46,699	272	21	46
UA9XBD	"	37,995	279	15	36
UV9CJ	"	23,001	195	10	31
UA9OS	"	5,537	43	16	33
UA9FGJ	7	58,884	268	24	60
UA9FD	"	16,284	143	14	32
UA9CAQ	"	242	14	5	6
UA9AL	3.5	96,876	521	15	54
UA9SGN	"	63,012	402	12	47
UA9KM	"	60,555	452	13	42
UA9FM	"	33,072	240	10	38
UA9SEX	"	13,104	119	10	29
UA9XFJ	"	4,975	74	6	19
UV9FM	1.8	57,997	355	11	48
UA9FAR	"	40,284	278	10	44
UA9SIJ	"	31,248	275	8	34
UA9AB	"	22,755	206	8	33
UA9CBO	"	15,696	165	7	29
UA9WNF	"	3,630	66	6	16
RAØFA	A	683,826	1013	109	177
UAØZI	"	339,966	824	91	111
UZØAB	"	225,120	430	80	160
UWØLT	"	129,675	281	79	96
UAØJGP	"	115,020	519	58	77
UAØSY	"	113,338	357	40	82
UAØZZ	"	58,464	383	35	37
UAØLCZ	"	55,545	205	46	69
UAØJDQ	"	16,224	113	35	43
UAØKCL	"	11,385	113	17	28
UWØCM	"	10,824	100	18	26
UAØQCA	"	4,896	60	11	25
UAØSGN	28	34,300	333	22	48
RWØAW	21	120,184	735	22	61
UAØLJ	"	37,417	197	26	45
UAØALG	"	24,696	340	14	14
UAØWAA	"	9,342	92	18	36
RWØAB	14	171,503	745	29	60
UAØUY	"	141,210	657	25	65
UWØUQ	"	90,150	478	23	52
UAØOCS	"	48,675	284	22	53
UAØBDW	"	47,808	301	21	43
UWØCN	"	22,518	159	21	33
UAØFM	7	69,972	371	28	56
RAØJJ	"	32,412	280	26	48
RAØJD	"	3,402	72	13	14
UAØOD	3.5	92,588	529	22	57
UAØSR	"	14,145	190	11	30
UWØFB	"	4,769	140	10	9

AZERBAIJAN

UD6DKW	A	86,658	270	48	95
UD7DZA	"	56,248	260	25	54
			(Opr. UD6DCY)		
RD6DEX	28	58,460	291	23	51
RD6DAB	3.5	29,216	281	10	34

GEORGIA

UF6FII	A	148,947	425	35	96
RF6FR	21	193,914	847	22	59
UF6FAL	3.5	102,960	561	13	53
UP2NK/UF	1.8	113,718	613	12	54
UF6FDR	"	25,715	251	8	29

KAZAKH

RL7AB	A	2,202,134	2109	112	286
RL7MAF	"	162,857	439	43	106
UL7BN	"	97,180	260	62	110
RL7LCT	"	5,992	77	22	34
UL8GBV	21	21,828	286	20	65
UL7EAR	14	70,680	280	28	65
RL7ABK	"	32,400	221	15	39
RL7GO	"	8,280	79	15	30
UL7TCU	7	38,918	270	16	42
UL8GBI	"	8,178	82	14	33
RL7AC	3.5	48,978	353	12	42
UL7TX	"	13,728	168	13	31
RL7LCV	1.8	7,328	99	9	23
UL7CCA	"	4,260	96	6	14

KIRGHIZ

RM8MA	28	2,370	80	12	18
UM8MRG	21	141,532	732	20	62
UM8MAE	14	6,946	61	15	31
UM8MBA	7	66,082	376	21	53
UM8MM	1.8	228	14	5	7

TADZHIK

UJ8AQ	28	4,716	65	14	22
UJ8JA	21	248,184	855	30	78
UJ8JW	14	83,555	393	13	56
UJ8JCM	7	37,000	280	13	37

TURKOMAN

RH8AA	7	13,920	135	13	27

UZBEK

UI8ADR	A	224,000	553	49	111
UI8AFI	"	3,624	190	27	53
UI9AWX	"	54,180	170	46	80
UI8AFA	7	298,920	1093	27	79
UI8BAA	3.5	32,426	242	17	45

EUROPE

AALAND ISLANDS

OHØBH	A	2,848,711	2697	153	434
			(Opr. SM5GMG)		

AUSTRIA

OE3RE	A	166,252	410	59	119
OE9SLH	"	109,440	308	44	100
OE3HCS	"	23,175	181	25	78
OE7SEL	"	20,972	127	35	63
OE1KU	"	945	27	7	28
OE3GSA	7	186,004	909	30	68
OE1TKW	1.8	561	21	5	16

AZORES ISLANDS

CU3AA	3.5	84,286	656	15	52

BALEARIC ISLANDS

EA6GP	A	94,019	433	42	107
EA6CL	"	65,067	291	35	88
EA6WY	21	3,597	57	11	22

BELGIUM

ON4XG	14	69,264	479	20	58
ON7JC	"	3,736	61	8	15
ON5EU	"	1,484	46	7	21

BULGARIA

LZ1CW	A	326,928	589	86	208
LZ1VA	"	249,223	546	79	168
LZ2KAD	"	138,387	606	46	117
			(Opr. LZ2RS)		
LZ1BJ	"	110,856	339	61	125
LZ1WL	"	88,920	256	64	107
LZ1IT	"	75,350	590	36	99
LZ2AG	"	61,380	350	32	92
LZ1FJ	"	29,580	200	33	83
LZ1KZM	"	16,800	134	19	81
LZ1YQ	28	70,928	314	29	75
LZ2ZA	"	18,096	87	24	63
LZ1KDP	21	474,157	1400	37	100
			(Opr. LZ1AX)		
LZ1RB	"	78,600	316	29	71
LZ1MG	"	37,688	256	23	45
LZ2VW	14	188,460	920	32	76
LZ1DF	"	16,896	153	19	47
LZ1KSN	7	318,230	1447	33	88
			(Opr. LZ1QN)		
LZ1RU	"	243,452	1181	31	90
LZ1KAZ	"	106,800	772	21	68
LZ1KOZ	3.5	39,402	572	11	50

CORSICA

TK5VN	A	63,623	169	51	112

CRETE

SV1NA/9	1.8	77,183	815	14	65

CZECHOSLOVAKIA

OK2BHV	A	1,463,712	1544	123	351
OK1VD	"	1,097,366	1559	107	266

SINGLE OP ZONE WINNERS

Zone	Call	Score	Zone	Call	Score
1	NL7DU	31,482	21	HZ1HZ	2,181,480
2	VE8CDX	198,100	22	VU2TJW	1,167,680
3	W6TMD	1,390,350	23	No entry	
4	W9RE	2,957,682	24	VS6TQ	172,985
5	K1EA	3,961,980	25	JA5DQH	1,894,644
6	XE2MX	1,785,470	26	No entry	
7	N3JT/HKØ	2,875,839	27	KC6CS	2,618,226
8	NP4A	7,247,448	28	9M6ZR	1,541,288
9	FY5YE	8,201,163	29	VK8AV	1,012,971
10	HD5X	7,850,590	30	VK2BQQ	601,920
11	ZY8AA	1,156,480	31	AH6AZ	1,238,496
12	CE1IDM	640,209	32	TO8KPG	1,719,843
13	LO8WW	1,391,355	33	CR9BZ	6,508,205
14	G3MXJ	2,233,868	34	PAØGAM/ST2	422,592
15	I4IND	4,188,034	35	D44BC	7,384,104
16	RU1DZ	1,481,193	36	9Q5NW	7.586,300
17	RL7AB	2,202,134	37	5H1HK	3,213,756
18	UA9YI	1,779,954	38	ZS6BSZ	1,008,730
19	RAØFA	683,826	39	S79D	17,328
20	5B4TI	5,816,907	40	OX3KD	161,838

OK1AJN	"	568,584	1002	85	233
OK3PQ	"	453,618	701	94	191
OK3FON	"	305,869	526	72	191
OK2PCF	"	216,505	625	52	163
OK2TBC	"	193,584	366	72	150
OK1EP	"	190,460	349	78	136
OK3YCA	"	189,854	441	57	134
OK3IAG	"	184,576	515	64	160
OK1KZ	"	177,125	532	47	126
OK2EC	"	173,600	387	62	162
OK3IF	"	159,732	402	60	144
OK1MKU	"	153,180	428	50	135
OK1DXW	"	150,699	472	56	135
OK1MNV	"	150,662	516	40	102
OK1FKW	"	142,785	503	49	118
OK1DGN	"	130,438	445	50	104
OK3CDZ	"	125,998	459	46	100
OK2DB	"	108,884	280	63	100
OK3CEL	"	103,075	522	42	113
OK1DZJ	"	75,764	250	46	70
OK2BBQ	"	70,789	383	30	103
OK3CWF	"	69,003	500	32	91
OK1MZO	"	66,990	318	39	115
OK1BB	"	65,415	208	48	99
OK3BA	"	64,493	311	38	105
OK1DVO	"	61,341	250	34	93
OK1MIU	"	44,788	159	45	97
OK1AJY	"	35,970	235	26	83
OK1MHI	"	34,344	230	28	78
OK2BLD	"	29,808	155	34	58
OK2PBG	"	28,815	159	34	58
OK3TEW	"	27,730	206	22	72
OK3KEG	"	27.020	218	24	46
OK2BCI	"	22,400	83	45	67
OK3EQ	"	20,196	74	41	58
OK3CPW	"	18,328	109	20	59
OK2SWD	"	18,000	131	23	49
OK2BCZ	"	17,236	250	10	52
OK3THM	"	16,915	72	33	52
OK1DAU	"	16,804	153	19	20
OK2UA	"	15,640	111	28	40
OK3ZWX	"	15,390	69	31	50
OK1FBH	"	8,701	52	30	47
OK1DLX	"	8,575	195	9	49
OK3TUM	"	7,579	139	20	33
OK3CEG	"	6,300	45	21	29
OK1AKI	"	3,321	87	8	23
OK3CMZ	"	224	16	6	8
OK1MG	28	35,992	150	25	63
OK2PO	"	31,120	147	27	60
OK2PAY	"	18,285	104	22	47
OK3CGN	"	16,872	125	23	51
OK3DG	"	4,900	36	19	31
OK6DX	21	269,760	889	30	90
OK1AYP	"	268,156	916	33	89
OK2QX	"	78,600	311	28	72
OK3CAP	"	75,754	309	30	68
OK3IR	"	58,200	231	28	72
OK1FTW	"	54,868	242	28	54
OK1FFU	"	43,400	241	25	45
OK1MPP	"	13,845	79	22	43
OK2PGT	"	6,464	87	12	20
OK1MSO	"	360	10	6	6
OK2BUW	14	240,840	856	35	100
OK1FV	"	116,610	436	34	96
OK2BGR	"	91,266	410	31	75
OK1DIL	"	80,010	313	30	75
OK2PAU	"	41,902	246	25	57
OK1MKI	"	31,872	304	18	46
OK2OVZ	"	24,444	213	17	46
OK1AYQ	"	23,200	185	19	39
OK3CAB	"	18,096	211	14	38
OK1DVK	"	8,322	55	24	49

OK1MAW	7	116,160	585	27	83
OK1AMF	"	98,770	455	33	86
OK1DFF	"	82,270	451	24	71
OK1ABP	"	75,790	419	27	79
OK1XJ	"	70,406	390	23	77
OK1FCA	"	42,975	376	17	58
OK3CAL	"	42,000	303	17	63
OK1AWF	"	33,048	302	17	55
OK1MNW	"	32,121	200	18	65
OK2LN	"	2,993	59	8	33
OK3CSQ	"	2,065	23	13	22
OK1DLS	"	1,518	46	23	66
OK1JDJ	"	1,488	30	8	16
OK3TAY	"	1,435	21	10	12
OK2SSS	3.5	52,800	557	14	52
OK1TD	"	49,038	521	14	52
OK2HI	"	44,544	530	13	51
OK3ZBU	"	36,465	520	14	51
OK1DRQ	"	16,826	332	8	39
OK1DWU	"	9,840	236	8	32
OK2SRA	"	8,584	227	5	32
OK2PFX	"	7,440	107	9	39
OK2SAT	"	7,062	199	8	25
OK2BWJ	"	6,948	187	7	29
OK1DSF	"	6,335	174	6	29
OK3TDO	"	6,222	77	11	40
OK1FNM	"	3,016	102	6	23
OK1AEH	"	2,850	83	5	25
OK1OFK	"	2.025	71	5	22
OK1OPT	"	504	27	4	14
OK1DFP/P	1.8	60,270	607	16	66
OK3CWQ	"	33,796	407	14	57
OK1DRO	"	20,191	297	10	51
OK1MG	"	18,585	239	9	54
OK1DRU	"	15,512	243	8	48
OL5BPH	"	12,300	230	7	43
OK1FZM	"	7,905	176	7	38
OL7BLO	"	7,172	154	7	37
OK2PAZ	"	6,612	98	8	49
OL7BQC	"	3,842	112	5	29
OK1ATP	"	3,750	53	9	41
OK3CVI	"	3,396	110	6	30
OL8CVU	"	2,970	111	6	27
OK2BDR	"	2,112	64	5	27
OL1BPK	"	2,001	70	4	25
OK1DWJ	"	1,716	34	9	24
OK1DQT	"	1,242	22	9	18
OK3ROS	"	1,026	38	5	22
OL9CUD	"	943	44	4	19

DENMARK

OZ1LO	A	2,133,460	2132	126	364
OZ5KU	"	299,640	620	66	161
OZ8AE	"	285,065	428	103	252
OZ1FAO	"	266,490	581	74	196
OZ2E	"	173,328	286	78	198
OZ1JVN	"	97,745	455	47	126
OZ5WQ	"	63,440	209	41	81
OZ7NB	"	41,128	213	31	66
OZ2NU	"	7,644	85	18	34
OZ3LR	"	2,860	55	21	31
OZ7HT	14	306,360	1125	34	86
OZ7YL	"	45,658	296	22	52
OZ1BIZ	"	25,048	192	20	42
OZ1CBW	7	22,528	255	17	47
OZ5DX	"	1,815	40	7	26
OZ6PI	"	1,650	39	5	17
OZ1FTE	3.5	85,042	432	24	77
OZ1HZI	"	23,263	468	7	35

ENGLAND

G3MXJ	A	2,233,868	1998	129	347
G4BUO	"	1,935,810	1758	126	344
G3UFY	"	717,060	1116	90	233
G4ODV	"	410,913	852	79	188
G3NKS	"	380,205	815	66	189
G3ESF	"	304,410	643	65	154
G3XVR	"	212,676	440	55	167
G3GGS	"	142,680	352	52	122
G6QQ	"	111,941	367	48	109
G6NK	"	6,802	86	15	23
G4ZME	"	6,683	95	13	28
G4CP	28	92,105	355	28	81
G3VMY	"	15,960	116	16	40
G3HCT	21	375,310	1134	32	97
G4CNY	"	323,520	1119	33	87
G3YDV	"	146,902	653	27	71
G3IGW	7	94,570	551	21	71
G4UOL	"	58,650	452	17	68
G4OBK	3.5	104,120	878	18	58
G4ARI	"	14,880	268	8	40
G3DYY	"	12,349	126	11	42
G4XTM	"	10,947	192	7	34
G3XTT	1.8	47,808	451	13	59

FAROE ISLANDS

OY2J	A	1,102,528	1898	91	276
OY3H	"	2,379	27	18	21
OY2H	21	595	25	7	10

FEDERAL REP. OF GERMANY

DL4BBO	A	1,958,190	2165	111	279
DF3CB	"	1,732,776	1442	131	396
DK6WL	"	985,167	816	114	320
DK6NP	"	811,580	816	114	320
DJ1XP	"	596,068	718	103	315
DJ6QT	"	564,984	843	88	254
DL1JF	"	564,804	684	102	246
DK2OY	"	557,865	980	89	226
DF5BM	"	537,993	697	90	249
DJ1YH	"	447,950	713	87	223
DL3LU	"	437,190	598	103	251
DL1SBR	"	429,341	921	67	186
DJ3TF	"	425,700	734	74	226
DL8KJ	"	410,766	646	86	221
DL3NCI	"	295,883	496	87	214
DJØYI	"	287,763	700	57	156
DL1TH	"	235,872	565	57	151
DL8SCG	"	232,064	451	72	187
DF3QG	"	221,850	402	78	177
DL7CF	"	187,187	378	64	157
DJ2YA	"	178,365	365	72	181
DJ4YS	"	159,354	247	94	140
DJ5AV	"	154,308	455	48	119
DL8OS	"	153,419	373	67	150
DK8KC	"	151,312	395	59	134
DJØKE	"	148,010	358	53	152
DFØRN	"	141,840	361	59	138
DL6LAM	"	136,836	323	44	137
DK3BJ	"	135,124	448	43	105
DL2JO	"	122,276	356	46	108
DJ2YE	"	118,848	288	53	139
DL2JX	"	113,367	349	47	112
DF1JC	"	113,295	248	53	142
DF4TD	"	86,428	333	48	116
DJØCP	"	82,584	282	39	109
DL8NBJ	"	82,368	267	44	100
DL3EBX	"	71,982	246	44	85
DK5AD	"	64,768	301	41	87
DL6HCC	"	63,583	458	18	55
DF3ZR	"	62,944	220	41	71
DJ2UU	"	43,848	214	31	85
DL3SBI	"	32,750	142	42	83
DK3OI	"	28,203	126	37	82

DK6QX	"	26,414	125	40	54
DK4RM	"	17,559	158	15	54
DF3QN	"	13,921	108	27	56
DF2RG	"	12,537	94	25	38
DL4NBV	"	12,155	121	22	43
DF6RI	"	8,190	96	16	23
DL9NCR	"	8,113	68	24	37
DL3SCR	"	5,635	43	21	28
DF2UU	**28**	**86,920**	**335**	**28**	**78**
DL2HBX	"	44,339	196	27	74
DK3KD	"	35,328	155	28	68
DL3ME	"	880	36	9	11
DLØIU	**21**	**241,254**	**790**	**32**	**84**
			(Opr. DL4AAE)		
DLØLR	"	95,824	387	32	74
DK8FD	"	13,360	128	14	26
DJ8FR	**14**	**300,957**	**1028**	**33**	**96**
DL4RX	"	169,244	648	32	84
DJ5GG	"	52,720	287	20	60
DK9MB	"	9,800	100	14	25
DJ1FC	"	4,655	63	10	25
DFØNT	"	52	5	2	2
DLØIU	**7**	**60,242**	**346**	**24**	**67**
			(Opr. DL4AAA)		
DJØIF	"	31,682	279	15	58
DK8FS	"	19,175	151	15	50
DFØDX	**3.5**	**146,580**	**1064**	**18**	**66**
			(Opr. DL4YBM)		
DL3HAH	"	**145,260**	**979**	**20**	**70**
DJ5JH	"	51,049	487	15	56
DL9LAI	"	19,680	361	7	41
DL4YAO	"	15,834	238	11	31
DL8NBE	**1.8**	**22,504**	**324**	**9**	**49**

FINLAND

OH6EI	**A**	**1,405,398**	**1673**	**111**	**283**
OH2PM	"	**859,408**	**1130**	**115**	**305**
OF6YF	"	529,420	1072	80	177
OH3TQ	"	330,880	504	88	232
OH6NIO	"	256,672	688	57	161
OH2BYS	"	216,660	392	83	231
OH7EU	"	203,036	414	76	187
OH4ML	"	195,144	358	80	202
OH6NEQ	"	126,720	418	52	128
OH6VR	"	116,871	269	60	103
OF6NEV	"	88,725	233	43	142
OH6RC	"	76,440	210	54	142
OH5VT/2	"	68,499	160	52	125
OH3MC	"	63,585	165	55	102
OH2CK	"	54,534	164	47	102
OH1RZ/3	"	34,034	126	42	101
OH9TD	"	30,900	181	28	75
OF7NW	"	28,431	175	31	86
OH7NGM	"	14,271	184	15	52
OF6NTO	"	11,814	74	27	29
OH5MX	"	10,549	94	23	54
OH1PY	"	5,206	48	16	22
OH3TY	**28**	**14,282**	**96**	**17**	**57**
OF2BNT	**21**	**17,136**	**144**	**18**	**45**
OH6MM	"	13,520	106	22	43
OH6NVC	"	10,797	91	16	45
OF7NM	"	9,774	111	18	36
OH5OT	"	7,367	70	17	36
OF3GD	**14**	**98,624**	**640**	**26**	**66**
OH1CQ	"	93,740	503	30	79
OH8LC	"	48,282	332	21	57
OF6CD	"	18,560	235	14	66
OH3WD	"	14,649	105	18	36
OF7RH	"	9,288	99	15	28
OF1TD	"	180	15	4	8
OF2HE	**7**	**176,278**	**827**	**30**	**76**
OH5PZ	"	15,529	131	15	53
OH9UW	"	13,039	120	14	45
OH2JA	**3.5**	**137,016**	**828**	**22**	**77**

FRANCE

F6BEE	**A**	**2,165,945**	**1910**	**123**	**344**
FE1JCB	"	**561,680**	**1125**	**76**	**202**
F6DKV	"	272,162	1201	44	134
F6HWU	"	162,800	332	65	135
F6EPQ	"	120,589	382	58	103
F6IJA	"	104,536	333	48	98
F6EQV	"	97,595	317	52	97
F6BVB	"	62,521	356	35	68
F9QE	"	40,400	209	34	67
F3AT	"	27,244	187	30	68
F6IIE	"	23,572	247	26	57
FD1JVP	"	20,880	120	28	59
F8TM	"	19,855	131	25	30
FD1MGZ	"	13,558	142	19	37
F6BPO	"	10,340	125	14	33
F6AUS	**28**	**177,749**	**607**	**29**	**92**
F6IRF	**21**	**287,850**	**1045**	**33**	**81**
FD1LJY	"	163,400	775	26	70
F5AM	"	8,760	106	12	18
F6GCP	**14**	**343,430**	**1267**	**34**	**88**
F6DYX	"	76,076	524	22	55
F5AH	"	43,940	417	17	35
F6CXL	"	17,020	208	11	26
F6BBJ	**7**	**302,376**	**1137**	**33**	**95**
FD1JKQ	"	21,076	238	11	33
F5MF	**3.5**	**34,170**	**449**	**11**	**40**
F8TQ	1.8	2,262	76	4	25

GERMAN DEMOCRATIC REP.

Y41RM	**A**	**1,092,690**	**1816**	**100**	**241**
Y44UI	"	**257,342**	**701**	**56**	**167**
Y47MN	"	**232,906**	**783**	**58**	**144**
Y28XL/A	"	**219,792**	**602**	**62**	**166**
Y78ZN	"	201,685	548	59	134
Y63SI	"	197,136	455	71	151
Y32VN	"	168,432	390	71	161
Y25JA/A	"	140,049	478	48	141
Y24SK/A	"	129,240	371	50	130
Y43VL	"	125,355	377	46	137
Y55TJ	"	108,570	260	58	152
Y22WF	"	87,801	341	38	73
Y43XL	"	87,492	459	34	104
Y55ZE	"	86,826	263	47	127
Y32QD	"	76,219	267	58	111
Y23RJ/P	"	73,569	341	38	99
Y32PI/P	"	58,838	171	51	95
Y31OJ	"	52,681	279	41	88
Y22GC	"	51,191	182	40	63
Y55XL	"	48,138	128	56	86
Y58WA	"	47,596	124	62	101
Y23SF/A	"	39,798	277	25	74
Y23CM	"	39,600	149	38	82
Y31EM	"	38,416	196	32	80
Y42HA	"	34,126	182	36	77
Y21FC	"	33,368	154	38	59
Y54WM/P	"	29,298	153	25	89
Y24SH/A	"	29,082	151	35	76
Y67UL	"	26,133	186	28	65
Y66RL	"	25,956	192	22	41
Y21NM/A	"	24,782	115	40	73
Y46IF	"	23,902	264	20	54
Y22LE	"	23,885	129	31	54
Y31JA	"	21,700	155	23	47
Y22HF	"	21,021	95	36	55
Y21EA	"	20,300	100	34	66
Y58ZA	"	20,224	92	35	44
Y24GB/A	"	17,927	83	40	51
Y56NM	"	17,290	80	38	57
Y33RA	"	17,028	91	29	57
Y32JK	"	16,644	101	25	48
Y26MH/A	"	15,743	95	28	63
Y24YH	"	14,868	88	19	40
Y22JA	"	13,846	55	34	52
Y21YH	"	13,608	128	19	65
Y37ZK	"	13,277	109	26	45
Y38ZM	"	12,558	57	33	45
Y31ON	"	12,533	86	29	54
Y47YM	"	11,988	62	34	40
Y37OM	"	10,920	69	31	47
Y27BN	"	8,704	63	17	51
Y42ZA /Y71ZA	"	8,591	82	22	49
Y53XM	"	7,830	111	16	42
Y37WK	"	7,685	75	20	33
Y39SH	"	7,656	51	26	32
Y24UB	"	7,571	52	26	41
Y42ZG	"	6,254	65	22	37
Y38ZB	"	5,959	43	25	34
Y25DA	"	5,656	36	24	32
Y33UL	"	3,795	31	24	31
Y59BA	"	3,528	28	21	28
Y66YF	"	3,480	46	13	16
Y26LG	"	3,465	27	20	25
Y25TJ/A	"	3,286	36	14	17
Y53VL	"	2,698	61	10	28
Y36VM	"	2,052	20	17	19
Y31NJ	"	1,690	28	11	15
Y28WG/A	"	1,260	18	13	17
Y31MB	"	984	15	11	13
Y55SG	"	682	13	10	12
Y21CL	"	621	13	11	12
Y68RF	"	204	9	6	6
Y28YL	"	90	9	3	6
Y23VB	28	3,116	30	15	23
Y43VF	**21**	**75,100**	**303**	**28**	**72**
Y34ZF	"	**63,650**	**265**	**27**	**68**
Y37ZE	"	57,330	250	26	72
Y87WL	"	23,465	136	24	41
Y62SM	"	19,981	131	20	33
Y23LG	"	13,420	82	19	36
Y27GL	"	8,888	79	16	28
Y23QD	"	6,950	59	17	33
Y22DK/A	"	3,000	32	13	17
Y23DL	**14**	**222,300**	**1053**	**27**	**63**
Y51XE	"	**124,047**	**582**	**28**	**71**
Y32EE	"	99,324	607	26	67
Y48YN	"	63,935	312	31	64
Y23HN	"	5,780	80	11	23
Y23GB	"	5,635	90	10	25
Y38YE	"	5,580	65	11	25
Y23ZL	"	5,215	97	10	25
Y22DK	"	2,547	60	9	24
Y21GO	"	1,178	31	13	25
Y49ZD	"	767	21	7	6
Y31TF	"	765	29	5	4
Y32VK	"	660	13	9	11
Y21FL	"	580	21	6	14
Y32UC	**7**	**78,387**	**613**	**823**	**66**
Y25TG	"	**51,759**	**407**	**17**	**64**
Y36UE	"	22,892	281	13	46
Y56SF	"	22,875	320	14	47
Y22BK	"	7,384	111	12	40
Y26FL	"	5,460	105	9	33
Y56ZA	"	4,816	83	9	34
Y22WK	"	2,912	84	6	26
Y41UF	"	2,812	50	11	17
Y22IC	"	260	10	5	5
Y77YH	"	80	10	2	6
Y25ZN	**3.5**	**7,611**	**171**	**7**	**36**
Y26DM/A	"	6,954	111	10	28
Y24YM	"	6,444	206	5	30
Y25NA/A	"	2,752	47	9	23
Y62TI	"	1,728	72	4	20
Y21RO	"	1,620	59	6	21
Y26PL	"	819	40	3	18
Y23KF	**1.8**	**5,772**	**159**	**6**	**31**
Y23FI	"	3,680	118	4	28
Y22XC/A	"	858	40	3	19

GREECE

SVØAA	A	2,380	63	5	29

HUNGARY

HAØMM	**A**	**2,361,485**	**2239**	**144**	**401**
HA5PP	"	**1,456,068**	**1767**	**114**	**312**
HA7UI	"	648,150	1240	82	216
HA8XX	"	385,838	875	81	185
HA4XX	"	334,500	817	70	180
HA5LZ	"	327,184	485	79	207
HAØHW	"	256,022	592	72	157
HA5BA	"	133,934	465	102	232
HA7ML	"	102,880	426	39	106
HAØNAR	"	70,880	198	56	104
HA2NI	"	69,300	404	21	105
HA1SL	"	62,172	234	39	93
HAØHG	"	47,854	217	39	103
HA1SD	"	44,368	208	41	118
HA6QD	"	17,424	114	34	54
HA5JI	**28**	**64,410**	**278**	**29**	**84**
HG3GD	"	22,770	126	26	43
HAØLP	**14**	**57,440**	**491**	**21**	**59**
HAØHV	"	49,680	306	20	52
HA8UE	"	24,495	188	19	50
HA8CO	"	8,064	117	14	34
HA9RE	**7**	**307,840**	**1390**	**34**	**96**
HA4KYN	"	**291,088**	**1418**	**29**	**84**
			(Opr. HA4ZZ)		
HA3PT	"	118,400	446	18	62
HA8UT	"	110,160	622	22	80
HA5NK	"	103,488	673	23	75
HG3DXC	**3.5**	**120,500**	**1006**	**22**	**70**
			(Opr. HA4XT)		
HA6NL	"	58,859	680	13	58
HA6PX	"	42,240	637	10	50
HA6VA	"	11,729	205	8	39
HAØIL	"	10,668	216	9	33
HA3JC	"	4,890	150	5	25
HA8CQ	"	1,950	74	6	19
HA5MY	"	1,056	51	4	18
HA5MM	"	522	27	5	13

ICELAND

TF3SD	14	14,993	142	14	33

ITALY

I4IND	**A**	**4,188,034**	**3204**	**147**	**395**
I3FDZ	"	134,125	325	60	125
IK2AHB	"	129,646	385	51	91
IKØFEC	"	95,667	299	43	100
IKØFEA	"	57,590	193	45	85
IKØFJI	"	51,680	290	24	61
IKØFWI	"	50,220	247	41	94
IY4FGM	**28**	**72,520**	**352**	**30**	**68**
IK6BAK	"	42,585	211	29	58
IK1CJT	"	21,824	131	20	42
IK1ICC	**21**	**225,693**	**863**	**36**	**81**
I2QIL	"	16,555	223	17	26
I5OQV	"	8,428	78	18	25
IV3JWR	**14**	**111,408**	**750**	**25**	**63**
IK2DVG	**7**	**572,958**	**1917**	**37**	**102**
IØZUT	"	66,856	551	13	48
IK8HJC	"	19,395	283	12	41
IK1BAE	"	12,926	171	9	37
IK4FNF	"	117	5	4	5
I03JSS	**3.5**	**226,164**	**1416**	**20**	**74**
I2DMK	"	35,526	463	13	49
I1XSG	**1.8**	**10,914**	**206**	**7**	**44**

ITU—GENEVA

4U1ITU	**A**	**1,358,742**	**2393**	**90**	**256**
			(Opr. W1RR)		

LIECHTENSTEIN

DL4IW /HBØ	A	12,960	196	11	43

NETHERLANDS

PAØINA	**A**	**504,288**	**776**	**81**	**207**
PAØUV	"	84,227	286	49	94
PA3BTH	"	49,140	193	42	84
PAØSKP	"	47,080	206	33	77
PA3ACC	"	30,975	115	32	73
PA3CXC	"	30,562	148	43	75
PA3BNH	"	18,009	137	19	50
PA3DUA	"	15,594	86	29	40
PA3CCF	"	13,855	58	33	52
PAØYN	"	12,285	75	21	44
PA3CAU	"	4,101	59	12	25
PA3BUD	**28**	**30,008**	**139**	**26**	**62**
PA2REH	**21**	**58,056**	**345**	**24**	**58**
PA3EOB	"	2,044	50	5	9
PA3EJW	"	72	8	2	1
PA3DMH	7	5,940	73	9	27
PAØTA	3.5	7,245	104	10	35
PAØDIN	"	2,856	84	5	29

NORTHERN IRELAND

GI4BBV	**A**	**185,922**	**415**	**57**	**141**

NORWAY

LA9XG	**A**	**45,816**	**136**	**49**	**89**
LA9PW	"	40,224	187	33	63
LA9VDA	"	31,395	199	33	82
LA1VL	"	19,125	135	28	47
LA9PEA	"	6,615	75	14	35
LA2OG	"	6,396	61	17	24
LA1HCA	"	5,220	40	19	26
LA2UF	**21**	**104,384**	**432**	**26**	**86**
LA8WG	"	14,910	226	17	42
LA2IE	14	5,700	101	8	12
LA9RFA	"	2,725	109	12	13
LA6SCA	"	143	13	3	8
LA8XM	**7**	**286,104**	**1090**	**36**	**95**
LA9HFA	"	756	28	4	5

POLAND

SP9DWT	**A**	**161,805**	**373**	**65**	**136**
SP9AKD	"	**159,280**	**360**	**59**	**161**
SP9BBH	"	151,712	460	49	127
SP3IOE	"	126,085	463	53	98
SP3HC	"	74,947	266	44	105
SP9FKQ	"	68,644	191	53	78
SP9ZD	"	59,496	222	48	100
SP9MRM	"	58,496	260	38	90
SP9EQS	"	42,003	240	30	87
SP8AOJ	"	34,224	296	29	63
SP3EQE	"	33,495	227	26	51
SP3BYZ	"	32,725	165	19	58
SP3LPR	"	31,283	164	40	69
SP6AUI	"	21,311	125	28	73
SP2HBP	"	14,734	163	14	39
SP2EFU	"	13,800	103	29	46
SP5CS	"	12,441	73	32	55
SP5LM	"	11,136	84	24	40
SP9ADY	"	9,128	62	23	33
SP6CYX	"	7,813	121	27	32
SP8HPW	"	7,632	75	20	28
SP4AVG	"	2,040	43	12	28
SP6LTF	**28**	**23,286**	**105**	**21**	**46**
SP5ES	"	792	14	11	13
SP5DIR	**21**	**91,455**	**338**	**31**	**79**
SP6EIY	"	33,390	200	23	40
SP4EEZ	"	31,098	194	22	49
SP8MJ	"	20,992	125	20	44
SP2GUB	"	12,265	88	18	37
SP9BRP	"	5,376	79	9	15
SP6AYT	"	5,328	76	10	14
SP9AIM	"	4,212	41	17	19
SP6BFK	"	2,206	34	11	12
SP3AOT	"	731	19	8	9
SP6HEK	**14**	**124,488**	**555**	**32**	**82**
SP9BCH	"	55,146	352	20	58
SP9NLK	"	50,879	330	22	61
SP8HXN	"	29,610	303	20	50
SP3BEJ	"	25,408	191	18	46
SP5YQ	"	8,610	81	15	26
SP3MGP	"	7,875	105	14	31
SP2AEL	"	5,850	64	11	28
SP2BME	"	5,811	65	15	24
SP8SIP	"	3,740	44	19	36
SP3CCT	**7**	**87,264**	**539**	**25**	**71**
SP5JTR	"	54,096	328	22	70
SP5JXK	"	27,360	327	12	48
SP1DPM	"	7,785	139	11	34
SP9JZT	"	6,598	76	12	48
SP9CVY	"	6,254	75	12	41
SP3LWP	"	4,125	48	12	21
SP5CTY	**3.5**	**81,954**	**632**	**20**	**67**
SP2BMX	"	49,859	613	15	58
SP5BWO	"	44,100	426	16	59
SP8TQ	"	10,575	199	9	36
SP3GDB	**1.8**	**21,816**	**409**	**7**	**47**
SP5ZA	"	8,569	208	6	35
SP5GH	"	7,119	64	10	53
SP5GRU	"	5,418	107	6	36
SP3BGD	"	4,921	135	5	32

PORTUGAL

CR6YH	**A**	**189,776**	**389**	**71**	**161**
			(Opr. CT1YH)		
CTICWT	28	16,146	179	15	39
CT1BQH	14	544	12	6	10
CT4DX	7	2,560	80	8	24
CT1AOZ	**1.8**	**71,336**	**460**	**15**	**59**

ROMANIA

YO3NL	**A**	**307,398**	**641**	**77**	**196**
YO7DO	"	209,220	500	58	162
YO2GZ	"	135,432	442	45	126
YO8FR	"	105,544	476	54	113
YO2DDN	"	60,214	237	26	128
YO5ALI	"	42,804	180	52	71
YO6DDF	"	36,960	113	59	61
YO3BWK	"	23,816	113	32	72
YO8RAZ	"	3,024	72	9	27
YO4AAC	"	2,112	42	22	26
YO8CMB /8	28	1,512	20	10	17
YO4ZF	**21**	**30,195**	**211**	**22**	**39**
YO5BAT	"	26,523	172	22	41
YO4BEX	"	4,830	72	12	23
YO2CMI	"	1,300	32	8	17
YO3NP	**7**	**173,040**	**972**	**28**	**77**
YO8AXP/P	"	93,748	779	23	79
YO8CDQ	"	59,976	440	20	64
YO4CAH	"	51,074	445	21	55
YO5CYH	"	33,356	229	13	49
YO4BBH	"	25,476	270	15	51
YO5CUU	"	13,671	128	12	37
YO4FEI	"	4,633	75	11	30
YO3CD	**1.8**	**48,672**	**519**	**15**	**63**
YO3QK	"	2,108	54	6	25
YO6AJI	"	561	34	4	13

SARDINIA

ISØMVE	**A**	**261,512**	**860**	**59**	**135**
ISØOMH	"	**261,183**	**860**	**51**	**130**
ISØXIE	"	169,290	592	55	143
ISØFPH	**1.8**	**16,587**	**266**	**8**	**49**
ISØODV	"	**12,801**	**238**	**9**	**42**

SCOTLAND

GM3RAO	**A**	**550,824**	**1118**	**62**	**174**
GM4VJV	"	250,860	1067	45	140
GM3CFS	"	184,576	501	59	147
GM4CXM	**21**	**209,253**	**793**	**29**	**84**
GMØIIO	"	21,268	198	16	36
GM4ENF	14	10,752	124	16	26
GM3VLB	**1.8**	**8,695**	**183**	**7**	**40**

SICILY

IT9GSF	**14**	**319,924**	**1347**	**35**	**86**

SPAIN

ED5EXI	**A**	**1,511,247**	**1867**	**112**	**299**
EA3FAA	"	**1,486,040**	**1999**	**109**	**279**
EA7AZA	"	260,064	535	71	145
EA4EP	"	227,968	502	54	154
EA3BQW	"	187,380	525	55	125
EA3DBO	"	126,519	396	58	123
EA2CR	"	21,276	118	38	70
EA3EYB	"	17,976	106	30	54
EA5DNO	"	17,629	155	20	41
EA2CFR	"	9,455	80	22	39
EA1DWI	**28**	**69,768**	**419**	**20**	**56**
EA5FMJ	"	23,634	123	27	51
EA1GT	"	17,160	240	11	29
EA4AYX	"	2,030	27	12	17
EA4BV	"	551	17	6	13
EA7FWG	**21**	**54,150**	**412**	**23**	**62**
EA5DJH	"	10,030	149	12	22
EA3DWX	"	1,196	24	10	13
EA5BQG	**14**	**74,130**	**582**	**19**	**51**
W5KI/EA	"	10,962	116	11	28
EA5BZM	"	6,708	84	11	28
EA2BLH	**7**	**79,316**	**603**	**17**	**62**
EA1KC	"	19,250	215	11	39
EA7AIN	**1.8**	**12,015**	**148**	**11**	**34**

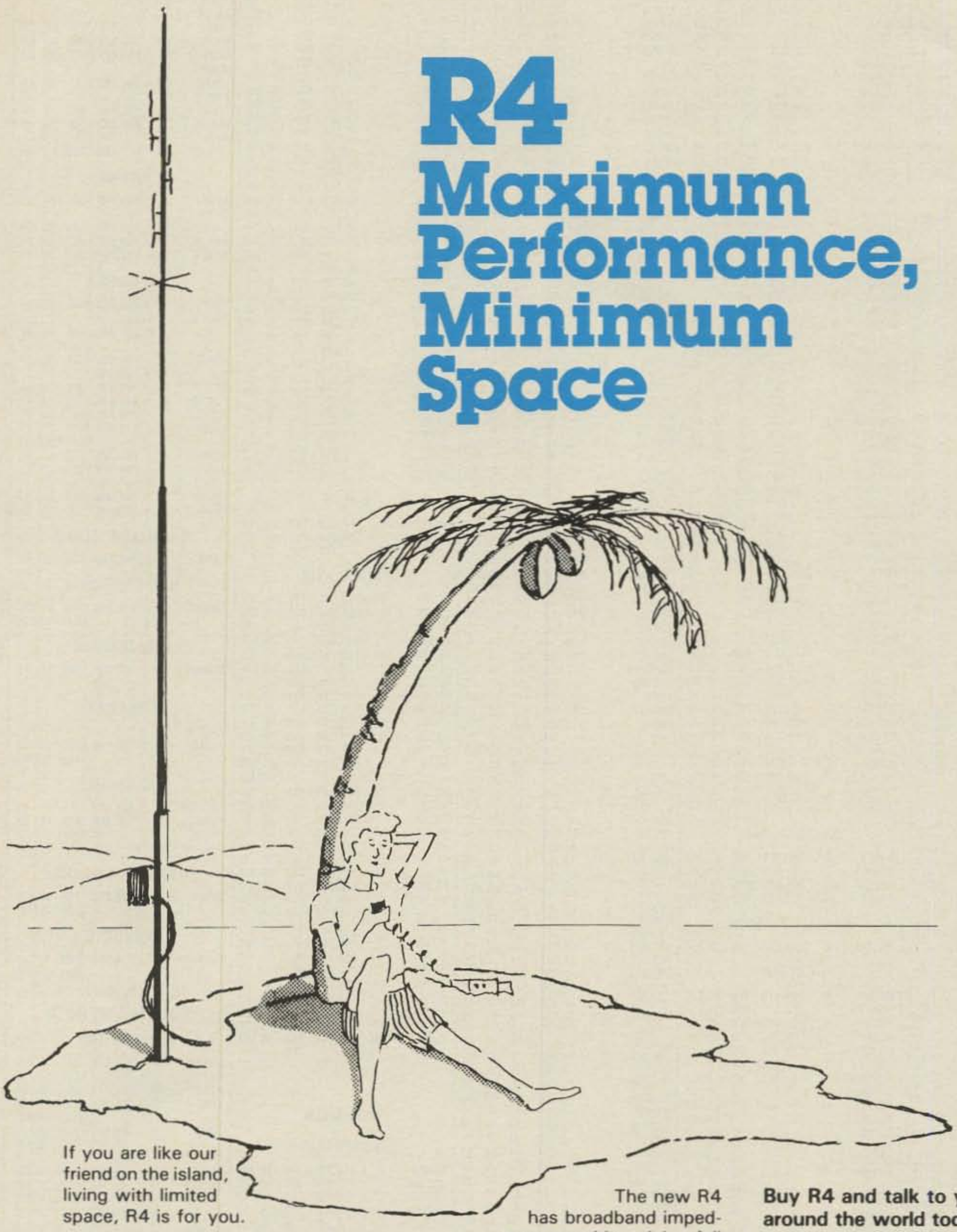
SWEDEN

SM5AOE	**A**	**600,042**	**928**	**84**	**207**
SMØTW	"	**298,302**	**641**	**67**	**182**
SKØMG	"	254,000	540	75	175
			(Opr. SMØBYD)		
SM5CLE	"	186,222	349	72	174
SM6ID	"	128,763	363	55	116
SMØBDS	"	101,724	262	51	96
SM6CVT	"	93,129	336	38	73
SM2CDF	"	22,440	204	31	79
SMØCOP	"	63,175	187	53	80
SM5RE	"	61,290	283	40	95
SM5CSS	"	46,943	161	50	107
SM5ODI	"	36,942	148	45	86
SM7LAZ-/6	"	36,656	210	34	82
SM6DUA	"	21,296	117	25	63
SMØBYD	"	21,156	79	47	76
SMØCGO	"	9,537	69	23	28
SMØRSM	"	9,164	77	27	52
SMØIFX	"	3,080	58	14	21
SMØDZH	"	612	17	6	6
SK6AW	**21**	**121,426**	**503**	**29**	**80**
			(Opr. SM6DED)		
SMØKV/Ø	"	55,900	285	24	76
SM6LWH	"	40,280	202	23	53
SL4ZXE	**14**	**318,682**	**1337**	**32**	**87**
			(Opr. SMØOGQ)		
SM6DHU	"	**311,448**	**1165**	**32**	**82**
SMØLPC	"	48,111	254	25	54
SM7TV	"	25,462	254	18	40
SM6JY	"	15,768	159	15	39
SK3AH	"	8,540	156	9	11
			(Opr. SM3COL)		
SMØCCE	**7**	**103,488**	**585**	**24**	**74**
SM6BJI	"	**86,427**	**498**	**25**	**74**
SMØBVQ	"	18,502	200	15	43
SM3CVM	"	1,020	35	4	6
SM6DYK	**3.5**	**95,304**	**765**	**21**	**67**
SM5MX	"	72,165	618	18	67
SM6MCW	"	26,970	247	19	43
SM6AOU	"	20,800	138	17	63
SM6LJU	"	15,104	174	16	43
SMØCCM	"	14,763	150	14	43
SM5BRW	"	7,536	108	10	38
SMØNUE	"	7,520	118	7	33

SWITZERLAND

HB9AGA	**A**	**828,289**	**1241**	**90**	**251**

R4
Maximum Performance, Minimum Space



If you are like our friend on the island, living with limited space, R4 is for you.

That's right, you can forget about towers and rotators. Put away your spade, wire and insulators because you won't need a ground radial system. Cushcraft engineers have performed a miracle by developing a new half wave vertical for 10, 12, 15 and 20 meters that provides great performance using a simple counterpoise ground of four 48" stainless steel rods.

The new R4 has broadband impedance matching giving full coverage and automatic frequency selection of all four bands. All of this with an 18' high, 8 lb. vertical that will handle 1800 watts of power!

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CIRCLE 9 ON READER SERVICE CARD

HB9CXR	"	376,922	758	68	179
HB9CVO	"	113,142	296	53	120
HB9AGH	"	55,238	152	55	87
HB9DFY	"	21,160	148	30	62
HB9QA	"	11,771	65	34	45
HB9BOW	"	5,865	60	20	31
HB9DDZ	28	6,579	47	19	32
HB9CJG	**21**	**183,860**	**678**	**33**	**83**
HB9DX	"	24,592	89	31	85
HB9CIP	**7**	**417,028**	**1601**	**35**	**102**
HB9CEY	"	23,458	153	17	57
HB9AMO	**1.8**	**97,064**	**762**	**19**	**69**

U.S.S.R. EUROPEAN

BYELO-RUSSIA

UC2OT	**A**	**440,928**	**1001**	**75**	**213**
RC2AU	"	132,000	624	46	130
UC2AT	"	15,390	99	16	41
UC2OCH	**21**	**138,852**	**539**	**32**	**84**
UC2WCY	"	8,789	80	16	31
UC2OAR	**14**	**64,436**	**385**	**26**	**63**
UC2WCX	7	24,156	264	17	49
UC2SD	"	8,096	140	10	36
UC2WAO	"	4,240	82	10	30
UC2SMC	"	260	18	5	8
UC2WO	**1.8**	**15,778**	**269**	**9**	**40**
UC2II	"	8,100	208	7	29

ESTONIA

UR2RER	**A**	**61,344**	**308**	**39**	**105**
RR2RW	"	32,760	110	53	87
UR2RKQ	"	32,172	244	22	62
RR2RU	"	17,952	70	42	60
UR2RBQ	"	12,474	102	20	57
UR2RHF	"	5,605	45	24	35
UR2RND	28	720	23	7	13
UR2QA	**21**	**60,334**	**272**	**28**	**69**
UR2RIY	"	5,472	94	13	25
RR2RX	"	3,915	49	15	30
UR2RMB	"	3,408	28	20	28
UR2RDO	**14**	**275,538**	**1153**	**33**	**81**
UR2RDB	"	40,211	218	22	57
UR2QD	**7**	**36,300**	**224**	**23**	**52**
UR2FU	"	9,666	117	14	40
UR2RIC	"	9,648	129	11	37
RR2RT	3.5	7,134	78	12	46
UR2RCD	"	980	32	4	24
UR2RME	**1.8**	**11,004**	**229**	**7**	**35**

EUROPEAN RUSSIA

RU1DZ	**A**	**1,481,193**	**1681**	**129**	**330**
RA3DX	"	**499,356**	**712**	**100**	**296**
UA4CK	"	**467,370**	**849**	**83**	**187**
RZ3AM	"	428,420	798	90	220
UA1ZO	"	421,006	876	56	125
UA1TCO	"	359,988	878	64	198
RZ3DF	"	356,400	693	91	239
RW3AU	"	269,126	476	85	201
UA4YJ	"	248,330	695	52	138
UA6YAH	"	240,221	529	69	160
UA4ALI	"	220,224	566	71	151
UA6BJQ	"	205,600	715	49	151
UA3ECJ	"	193,499	631	46	133
UA4LCL	"	145,612	940	32	86
RW3ZC	"	129,685	390	57	128
UA4AHA	"	128,064	467	48	126
UA3VLO	"	114,296	398	47	135
RA3AOD	"	106,005	302	58	133
UA6LIG	"	99,900	364	51	134
UA4ANZ	"	86,625	273	50	115
UA3ST	"	83,144	311	44	108
RZ3DZ	"	75,060	256	51	129
RA3VA	"	69,454	321	36	85
UA3ASL	"	65,520	257	44	82
UA4LCQ	"	58,725	239	50	85
UA6YHR	"	52,334	144	53	84
UA1OML	"	51,272	250	33	83
UA3ICJ	"	49,105	217	32	83
UA3ZOY	"	44,104	210	50	98
UA1OIZ	"	43,179	148	44	67
UA3RA	"	42,362	236	32	86
UA4NEJ	"	39,675	174	41	74
UA3TAM	"	35,595	225	29	76
UV1CD	"	33,925	238	28	87
UA4UCC	"	31,059	239	23	64
RV6AF	"	30,160	117	53	77
UA3QBX	"	25,576	164	29	63
UA6LFQ	"	24,198	120	37	74
RA1QE	"	22,058	155	24	58
UA4SSS	"	17,700	173	22	53
UA1OAM	"	16,236	98	26	56
RW3DC	"	16,000	122	25	55
RA3GD	"	15,189	172	16	45
RZ3DM	"	14,852	86	29	65
RA3WZ	"	13,650	143	22	53
RA1OAK	"	4,510	42	21	20
RW6AA	"	1,550	26	12	13
UA3TGO	"	1,500	34	11	19
UA4HNP	**28**	**19,600**	**167**	**21**	**49**
UA6BPM	"	18,396	163	21	52
RA3RN	"	3,034	42	12	25
UA3PB	"	399	11	8	11
UW3AA	**21**	**173,228**	**659**	**33**	**91**
RZ3DX	"	**133,340**	**542**	**31**	**87**
UW3UO	"	100,293	535	28	73
UW6MA	"	67,868	352	26	68
UA4HKJ	"	60,952	472	24	52
UA4PMG	"	30,780	241	22	54
RV6AA	"	29,346	264	20	47
UA3XCT	"	29,064	131	25	59
UA3LAR	"	27,450	160	25	50
UA3LHA	"	26,082	188	23	40
UA4CMF	"	20,384	240	15	37
UA3XEH	"	18,538	192	16	30
UA3XBB	"	16,317	128	23	40
UA3PNN	"	14,750	131	18	32
UA1QBQ	"	12,626	117	18	41
UA3XDF	"	1,344	24	10	18
UA6AJJ	**14**	**196,677**	**848**	**33**	**84**
UA1TAL	"	**62,582**	**367**	**22**	**61**
UA1ANP	"	59,748	418	21	57
RA3UC	"	33,495	190	22	55
UA1QBV	"	26,068	181	24	52
UW3HY	"	22,754	173	20	42
UA4ZW	"	17,199	222	13	36
UZ6HO	"	16,640	114	23	42
UA4NEA	"	8,832	128	18	46
UW3ICF	"	6,615	69	14	21
UA1AJ	"	6,475	131	11	24
UA3XN	"	1,368	39	7	17
UW3CE	"	225	9	7	8
RA4PC	**7**	**77,616**	**335**	**27**	**72**
UW1CX	"	46,137	215	26	65
UA3XAW	"	33,078	320	16	58
UA4CEU	"	24,675	168	20	55
UA3BK	"	12,654	139	16	41
UA3TDR	"	8,060	124	10	42
UA3GO	"	2,923	46	10	27
UA3XDM	**3.5**	**73,863**	**588**	**19**	**68**
UV3QA	"	**59,276**	**605**	**15**	**58**
RW6AC	"	37,275	376	16	59
UA6AX	"	32,460	426	12	48
UA1AUA	"	31,691	381	13	54
UA1AMR	"	30,186	442	11	43
UA3PFW	"	23,088	328	9	43
UW6AL	"	20,955	305	13	42
UA6BBS	"	18,304	249	10	42
UA3DIJ	"	15,350	254	10	40
UA3YAO	"	13,038	270	7	34
UA4AO	"	13,008	192	7	41
UA6AQV	"	13,005	224	9	36
UA3TU	"	12,264	171	12	44
RA1QC	"	10,140	210	8	31
UA1ZGT	"	9,620	248	8	29
UA3ADG	"	8,382	213	6	27
UA3YFT	"	5,828	166	7	24
UA4FY	"	3,298	82	6	28
UV4CD	"	3,120	54	9	30
UA3PNO	"	817	28	6	13
RA3DOX	**1.8**	**21,728**	**295**	**9**	**47**
RA6AOS	"	19,209	261	10	47
UA3DJG	"	11,776	193	7	39
UA6ATC	"	8,008	148	9	35
UA3ATV	"	7,654	138	8	35
RW6PB	"	6,588	129	7	29
RA6LW	"	5,544	119	6	30
UA3DOS	"	3,162	74	6	28

KALININGRAD

UA2FZ	**A**	**87,769**	**391**	**27**	**52**
UA2FFA	"	15,600	99	28	50
UA2FGA	**3.5**	**403,686**	**1918**	**30**	**93**
UA2FJ	**1.8**	**37,635**	**490**	**10**	**55**

KARELIA-FINNISH

UN1CD	A	18,080	138	95	250

LATVIA

RQ2GN	**A**	**743,820**	**1254**	**95**	**250**
UQ2GT	"	150,245	486	63	136
UQ2GFU	"	123,840	408	49	123
UQ2GD	"	16,289	106	30	61
UQ2GKO	"	1,566	50	8	19
UQ2GBJ	"	1,334	42	9	20
UQ2GKQ	28	405	15	7	8
UQ2GLQ	21	5,512	40	22	31
UQ2GIZ	**14**	**160,160**	**763**	**28**	**82**
UQ2GMB	"	48,972	323	21	56
UQ2GQ	"	8,900	86	15	35
UQ2GEO	"	5,434	79	10	16
UQ2GEC	"	224	10	7	9
UQ2GIP	**7**	**54,384**	**350**	**23**	**65**
UQ2GJV	"	41,840	384	18	62
UQ2GCW	"	5,760	56	13	23
UQ2GM	**3.5**	**114,580**	**785**	**20**	**65**
UQ2GN	"	98,560	220	19	61
UQ2GGP	"	21,489	305	12	45
UQ2GHJ	"	19,680	492	14	46
UQ2GHB	"	18,974	309	9	44
RQ2GIG	"	15,340	240	9	43
UQ2GOV	"	4,620	127	10	32
UQ2PZ	**1.8**	**20,280**	**269**	**10**	**50**
UQ2PJ	"	6,981	150	6	33
UQ2GQD	"	1,750	66	5	20

LITHUANIA

UP3BP	**A**	**1,676,988**	**1757**	**120**	**324**
UP3BO	"	**746,250**	**1114**	**95**	**280**
UP2BR	"	660,330	1085	93	252
UP3BU	"	555,472	1140	70	228
UP2BSP	"	358,608	850	62	179
UP2BKJ	"	179,578	580	50	152
UP2BIP	"	147,456	280	80	176
UP3BA	"	136,530	603	47	138
UP2BOS	"	131,480	489	47	126
UP2ND	"	100,320	327	46	119
UP2PAQ	"	81,540	363	37	98
UP2BBF	"	79,756	266	52	105
UP2BB	"	44,034	254	31	92
UP2PBM	"	36,850	249	31	79
UP3BQ	"	36,252	223	37	77
UP2BDO	"	23,712	171	27	77
UP2PCF	"	19,360	131	26	54
UP2BKT	"	16,874	234	16	43
UP0BA	"	1,904	52	10	24
UP2OU	28	17,082	100	24	54
UP3BX	**21**	**86,130**	**320**	**30**	**80**
UP2FF	"	13,939	110	19	34
UP2BEJ	**7**	**62,010**	**439**	**22**	**68**
UP2BKA	"	40,762	250	21	68
UP2PCI	**3.5**	**192,276**	**1175**	**26**	**72**
UP2BOA	"	58,888	698	13	55
UP2OQ	"	51,150	546	13	53
UP2BIW	"	50,197	560	17	54
UP2BKM	"	47,190	575	13	53
UP2CT	"	39,034	565	12	46
UP2BRE	"	20,950	384	10	40
UP2BHK	"	8,816	200	8	30
UP2BGG	"	7,514	206	6	28
UP2BLF	"	368	21	4	12

MOLDAVIA

UO5OEW	**A**	**285,138**	**770**	**58**	**159**
UO5ODA	"	64,328	226	43	93
RO4OZ	"	63,250	352	33	92
UO5OJM	21	1,534	36	8	18
RO4OA	**14**	**380,986**	**1373**	**37**	**105**
UO5WU	"	36,182	177	27	52
UO5ON	**7**	**45,152**	**414**	**16**	**52**
UO5GR	3.5	7,802	117	10	37
UO5AP	"	3,500	58	7	28
UO5OBT	**1.8**	**6,916**	**157**	**6**	**32**

UKRAINE

RB5IA	**A**	**768,924**	**1072**	**114**	**289**
RB5GW	"	**466,932**	**719**	**98**	**236**
RB5EX	"	**435,092**	**852**	**75**	**212**
UB5IAN	"	314,442	786	64	179
RB5QR	"	236,208	495	79	180
UB4MC	"	208,640	425	81	175
UB0YW	"	169,128	346	74	169
UY5TE	"	164,735	572	64	171
UB5EPV	"	147,615	463	59	136
UB5TN	"	144,828	306	72	171
RB5VF	"	139,,279	411	57	140
UB5JS	"	132,583	430	51	136
RB5IIU	"	112,520	361	56	138
UB5UHJ	"	111,216	462	36	132
UB5WJ	"	106,640	242	65	150
UB5MMP	"	105,640	403	44	108
UB5IKN	"	103,194	276	50	139
UB5PAG	"	98,350	295	51	124
UB4IM	"	90,666	261	55	152
UT5LF	"	90,255	362	43	122
RB5RF	"	80,070	268	46	124
RB5VB	"	75,509	240	41	120
UB5FCE	"	72,762	275	41	93
UB5IKZ	"	61,408	194	55	97
UB5EF	"	60,214	284	44	110
UB5VK	"	53,584	237	36	100
RB5AE	"	53,406	215	43	95
UB5HA	"	50,427	228	36	81
UB5EQB	"	49,178	262	37	97
RB5AT	"	29,532	203	28	79
UB5WDD	"	27,384	161	20	64
UB4LAT	"	23,335	131	25	40
UB5KBG	"	22,860	156	25	65
UB5FAK	"	22,440	172	22	46
UB4JA	"	22,165	126	21	34
UB5LEE	"	20,544	131	31	65
UB5CCP	"	16,560	79	32	40
UB5EIT	"	13,200	99	29	59
UB5PBG	"	11,098	61	26	36
UB5WBJ	"	10,168	119	16	46
RB5FH	"	4,350	33	19	31
UB5KAG	"	3,744	38	19	29
RB5MP	"	2,040	38	10	20
UT5HP	"	1,564	17	17	17
RB5WW	28	20,145	107	25	60
UB5UAT	"	10,660	67	23	42
RB5TU	"	4,830	52	17	25
UB5CDF	"	4,554	48	15	31
RB5VW	"	2,048	34	12	20
U5WF	**21**	**171,241**	**580**	**33**	**86**
UB5ZCW	"	**107,004**	**470**	**30**	**81**
UT5JCW	"	88,200	427	28	72
UB5BZ	"	48,048	240	25	63
RB5IOV	"	28,296	216	22	50
UB5VY	"	18,000	122	21	39
UB5FDM	"	10,850	118	15	35
UB5IPH	"	10,816	111	17	35
UB5EFW	"	10,150	63	23	47
UB4ME	"	8,856	80	17	24
RB5QL	"	8,400	94	17	33
UB5NQ	**14**	**252,280**	**921**	**36**	**100**
UB5LST	"	**63,993**	**434**	**25**	**58**
UB5VAA	"	62,333	443	22	61
UB5LUY	"	47,880	258	28	62
UB5IOM	"	42,484	333	24	52
RB5WR	"	35,912	242	19	48
UY5WA	"	23,188	217	18	50
UB5IBV	"	20,301	166	19	48
UB5TCL	"	11,308	153	12	32
UB5AJP	"	8,050	117	16	30
UB5CN	"	6,350	57	17	33
UT5UCM	"	392	14	5	9
RB5HM	**7**	**134,922**	**646**	**31**	**82**
UB5CE	"	**103,005**	**539**	**29**	**80**
UB5IHL	"	101,545	465	29	86
RT5UM	"	62,985	450	19	66
UB5ILW	"	48,683	305	23	66
UB5XBD	"	15,494	191	11	50
RB5HB	"	7,830	99	13	41
UY5LO	"	5,016	90	9	35
UT5UCK	"	2,784	36	11	18
UB5IDA	"	2,356	41	11	20
RB5LO	**3.5**	**76,524**	**618**	**19**	**65**
UB5IFN	"	**60,669**	**632**	**15**	**48**
RB5MA	"	42,573	451	17	52
RB5SA	"	39,104	531	12	52
UB5FAN	"	38,860	587	10	48
UB5NCV	"	36,424	476	11	47
UB5IHQ	"	20,088	303	9	45
UB5RFT	"	18,718	359	9	40
UB4UD	"	18,179	283	9	40
UB5ENV	"	12,672	215	9	39
UB5IFH	"	12,240	226	8	37
RB5EEU	"	10,604	207	8	36
RB5MFT	"	7,925	232	9	25
UB5PBP	"	6,112	187	5	27
RB5BA	**1.8**	**35,642**	**416**	**13**	**58**
UB5ZAL	"	**33,552**	**361**	**14**	**58**
UB5SDX	"	23,790	354	13	52
UB5YFZ	"	8,856	209	6	35
UB5IMR	"	7,600	160	8	32
UY5ZP	"	5,145	127	6	29
RB5UI	"	3,838	185	7	31
UB5EQG	"	1,408	52	6	16

WALES

GW4RHW	**A**	**387,276**	**792**	**68**	**168**
GW3JI	"	**380,014**	**758**	**64**	**187**
GW3GWX	1.8	1,125	39	5	20

YUGOSLAVIA

YU7BJ	**A**	**1,797,600**	**1937**	**131**	**349**
YU3EF	"	**1,309,500**	**1482**	**125**	**325**
YT7KW	"	191,422	505	70	226
YU7SF	"	160,632	425	63	131
YU3RU	"	125,244	247	73	123
YU2EU	"	118,469	411	54	115
YU7KM	"	76,726	229	51	118
YU2CNM	"	62,178	408	30	56
YU4MA	"	26,522	115	39	50
YU1RA	"	25,500	105	38	64
YU3ZO	**28**	**76,328**	**339**	**29**	**65**
YU7GW	"	62,260	119	32	78
4N4A	**21**	**491,419**	**1473**	**37**	**100**
			(Opr. YU4EJC)		
YU1LA	"	**397,980**	**1215**	**36**	**96**
YU7AV	"	333,794	977	36	98
YU2IQ	"	193,908	780	32	81
YU7FT	"	37,392	208	25	57
4N2B	"	18,292	171	19	34
YU3MF	"	12,210	83	22	33
YT3AA	**14**	**627,414**	**1723**	**38**	**121**
4N7N	"	**575,355**	**1712**	**39**	**126**
4N3W	"	54,188	411	22	54
YZ2S	"	21,291	188	14	33
YU3PG	"	17,325	170	14	41
YU3ZV	**7**	**709,104**	**2012**	**38**	**120**
YT7A	"	**387,393**	**1667**	**36**	**103**
YU3QI	"	111,069	499	31	91
YU3OJ	**3.5**	**72,432**	**696**	**14**	**58**
YU1KQ	"	64,980	807	12	48
YU1YV	"	34,216	300	20	36
YU1EA	"	2,548	74	6	20
YU3MM	**1.8**	**30,016**	**388**	**10**	**57**

OCEANIA

AUSTRALIA

VK8AV	**A**	**1,012,971**	**1187**	**103**	**188**
VK2BQQ	"	601,920	910	90	138
VK6SM	"	157,950	390	47	88
VK2AIC	"	11,685	96	15	26
VK2SU	"	2,220	36	9	11
VK4XA	**28**	**111,207**	**681**	**23**	**34**
VK8BE	"	2,352	33	14	14
VK2APK	**14**	**370,090**	**1062**	**35**	**84**
VK4TT	"	45,582	216	28	43
VK5AGX	7	12,775	126	17	18

BELAU

KC6CS	**A**	**2,618,226**	**2691**	**134**	**200**
			(Opr. JE1JKL)		

EAST MALAYSIA

9M6ZR	**A**	**1,541,788**	**2223**	**94**	**142**
			(Opr. WA2HZR)		

FRENCH POLYNESIA

FO4UTO	**14**	**448,134**	**1325**	**34**	**80**
			(Opr. FO5BI)		

GUAM

JA1BK /KH2	A	18,900	146	21	24
KH2F	**28**	**320,528**	**1190**	**31**	**61**
KH2D	**21**	**493,476**	**1427**	**36**	**82**
NY6M /KH2	**14**	**438,248**	**1290**	**33**	**83**
KD6TB /KH2	"	73,188	340	28	48
KG6DX	**7**	**212,333**	**746**	**28**	**69**
N7DF /NH2	"	51,165	383	20	25

HAWAII

AH6AZ	**A**	**1,238,496**	**1881**	**101**	**123**
WR6M /KH6	"	156,114	544	49	49
KH6JAT	"	46,800	327	23	25
KH6CC	**1.8**	**22,724**	**331**	**10**	**13**

INDONESIA

YB0TK	**A**	**1,255,483**	**1299**	**115**	**216**
YB0ATB /3	"	606,390	846	84	162
			(Opr. PA0LOU)		
YB1BZ	"	405,685	794	56	117
YC2UDH	"	11,247	66	31	38
YC2CTW	**28**	**89,672**	**350**	**24**	**64**
YB0ARA	**21**	**695,610**	**1786**	**34**	**97**
YC3HCM	"	358,285	1047	34	97
YB0ZAA	"	304,000	1021	30	70
			(Opr. YC0ECT)		
YC0TSU	"	245,775	750	33	80
YB2FEA	"	94,512	359	27	61
YC5PD	"	54,340	283	26	39
YB7HB	**14**	**48,980**	**280**	**23**	**39**
YB3ASQ	7	10,956	89	18	26

MACQUARIE ISLAND

VK0ML	**A**	**36,765**	**285**	**28**	**25**

NEW CALEDONIA

TO8KPG	**A**	**1,719,843**	**2364**	**94**	**155**
			(Opr. FK8DD)		

NEW ZEALAND

ZL1BSG	**A**	**61,000**	**199**	**49**	**73**
ZL1AIZ	"	24,735	104	37	48

OGASAWARA

7J1ADX /JD1	**A**	**1,546,720**	**2921**	**100**	**180**
			(Opr. F2CW)		

PHILIPPINES

K4YT/4E	A	44,472	143	44	65
DU3BAA	**28**	**66,850**	**428**	**18**	**32**
DU1TV	"	16,164	153	16	20
DU1KWT	21	1,440	49	5	6

SOUTH COOK ISLANDS

ZK1TB	**A**	**495,672**	**770**	**98**	**130**
			(Opr. W7TB)		

VANUATU

YJ0A	**A**	**759,969**	**1380**	**76**	**113**
			(Opr. K5BDX)		

SOUTH AMERICA

ARGENTINA

LU1EWL	**A**	**275,964**	**527**	**71**	**112**
AY7JI	"	14,566	205	51	62
AY6EF	**28**	**552,448**	**1461**	**32**	**96**
LU1E	"	**492,140**	**1511**	**30**	**80**
			(Opr. LU2DSL)		
AY4F	"	353,682	1225	25	73
AY2YE	"	86,955	580	24	69
AY1CJY	"	59,712	327	21	43
AY2FFV	"	28,756	198	19	33
LO8WW	**21**	**1,391,355**	**3198**	**37**	**110**
			(Opr. LU8DQ)		
LU1AF/D	"	693,765	1784	36	99
LU2DVG	"	3,591	71	10	9

BRAZIL

ZY8AA	**A**	**1,156,480**	**1428**	**88**	**190**
			(Opr. PY8CL)		
PY2OW	"	**248,535**	**337**	**87**	**176**
PY2RLQ	"	95,676	275	36	83
ZV2CW	"	70,416	171	54	90
PY2MM	"	41,360	154	40	54
PP2WV	"	29,388	164	27	35
PT7SD	"	28,476	119	38	75
PP5AVM	"	23,750	91	41	54
PY6BG	"	7,344	49	24	30
ZY4WS	"	5,184	40	21	27
PY5CA	**28**	**695,728**	**1757**	**35**	**99**
			(Opr. N5FA)		
ZY5FR	"	158,688	476	34	80
PY5BVL	"	67,373	264	28	61
ZY3TD	"	57,000	437	18	22

PY2RN	"	56,538	252	29	52
PY2CAR	"	29,108	139	25	51
PY1AJK	"	19,089	129	27	36
PY2GJR	"	1,092	23	12	9
ZY5AKW	**14**	**45,985**	**189**	**29**	**56**
PY2FRD	"	15,496	104	19	33
PY2VH	7	1,040	23	9	7
PY2DP	3.5	24,780	145	20	40
PY1BVY	**1.8**	**4,824**	**92**	**10**	**8**

CHILE

CE1IDM	**A**	**640,209**	**1268**	**67**	**110**
CE3BFZ	"	64,988	292	32	45
CE2BFR	**14**	**142,320**	**574**	**25**	**55**
CE8PD	**7**	**33,304**	**249**	**18**	**28**
CE6HIY	"	16,308	160	16	20
CE6NOT	"	2,712	43	11	13

COLOMBIA

HK1KXA	**21**	**417,150**	**1365**	**29**	**74**
HK1AMW	**3.5**	**177,120**	**728**	**22**	**60**

EASTER ISLAND

CE0ZIG	**14**	**223,737**	**697**	**34**	**73**

ECUADOR

HD5X	**A**	**7,850,590**	**5153**	**145**	**361** (Opr. KO2M)
HC7SK	**3.5**	**103,273**	**567**	**19**	**42**

FRENCH GUIANA

FY5YE	**A**	**8,201,163**	**5307**	**142**	**381** (Opr. OH2MM)

NETHERLANDS ANTILLES

P40GD	**A**	**7,952,283**	**5163**	**142**	**405** (Opr. W2GD)

PERU

OA4ZV	**A**	**1,769,116**	**2001**	**103**	**199**

SOUTH ORKNEY ISLANDS

LU1ZA	**A**	**110,000**	**679**	**26**	**29**

TRINIDAD & TOBAGO

J6LAD/9Y	**A**	**377,316**	**695**	**65**	**123**

URUGUAY

CX7BY	**21**	**972,257**	**2300**	**37**	**106**
CW8B	**14**	**1,011,036**	**2182**	**36**	**120** (Opr. CX8BBH)
CX6BM	**7**	**28,272**	**131**	**27**	**49**

VENEZUELA

4M7A	**28**	**741,312**	**2448**	**23**	**73** (Opr. YV7QP)
YV4ABR	**14**	**37,296**	**261**	**16**	**32**
YW1O	**7**	**758,898**	**2016**	**32**	**94** (Opr. YV1DIG)
YX5A	"	**621,489**	**1879**	**29**	**82** (Opr. YV5ANT)

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

UNITED STATES

K1GQ	**5,524,602**	**2815**	**162**	**507**
AA1K	**3,559,869**	**2009**	**164**	**455**
KY1H	2,912,620	1860	142	406
KM1C	2,086,884	1415	141	372
K1DG	1,967,338	1364	140	362
W1PH	1,693,536	1240	128	344
K1IU	1,519,479	1095	144	363
KA1X	471,675	585	88	197
WB1CNM	421,008	455	98	238
W1GG	299,184	388	79	197
KT1O	293,040	404	88	176
KA1CB	282,486	374	70	197
N1AU	187,615	280	79	160
AI3E/1	143,090	247	64	141
KA1KPH	115,962	190	81	150
NC1B	44,880	108	68	97
N2RM	**5,222,100**	**2673**	**171**	**505**
N2MM	**2,525,592**	**1553**	**160**	**404**
KQ2O	1,332,027	1100	114	309
K2TD	1,306,800	1044	119	313
W2UI	413,542	492	94	215
NF2L	264,759	448	66	147
N3RS	**4,979,475**	**2537**	**168**	**507**
W3BGN	**4,485,280**	**2281**	**173**	**507**
K3OO	3,064,812	1818	153	429
K3WW	2,901,384	1883	144	387
W3XU	2,397,860	1821	128	324
W3GG	1,990,660	1453	136	346
K3IE	1,377,385	1143	114	301
WB3CAC	737,352	750	97	245
K3UEI	505,630	607	92	203
K3NZ	473,310	608	79	191
W3AZ	437,844	485	96	225
KS3F	377,190	472	96	201
AJ3H	100,825	210	60	125
WA3IJZ	26,935	182	42	94
N4WW	**4,724,200**	**2541**	**166**	**484**
N4RJ	**3,997,947**	**2085**	**178**	**495**
W4FX	1,479,623	1215	119	312
W8ZF/4	1,086,876	725	158	374
K4CEF	1,024,320	773	143	337
K4MF	811,047	707	119	290
AA4DO	786,016	704	127	279
N8LM/4	781,500	757	113	262
WA4QQV	636,928	749	105	206
K3KG/4	561,204	465	153	323
K4XR	432,788	447	135	286
AA4MJ	285,418	401	87	172
WA4CTC	126,850	210	75	140
WA4KIL	75,096	159	61	107
WB4GNT	31,174	108	36	73
N3BB/5	**2,242,200**	**1551**	**152**	**353**
N5RM	1,408,554	1129	140	301
N6RO	**4,229,248**	**2506**	**175**	**417**
N6VV	**1,830,650**	**1373**	**153**	**317**
WR6R	1,387,488	1367	130	258
WV6N	563,040	696	112	176
W6BA	474,328	590	100	181
N6JV	448,920	474	124	224
W6OAT	413,826	426	124	230
W6BIP	413,616	468	126	210
K6TQ	382,510	482	113	177
W6ERS	65,709	171	66	83
KE6WL	13,530	60	37	45
N6OU	4,628	43	25	27
K8AZ	**3,537,100**	**1959**	**166**	**454**
WA8DXG	1,891,536	1308	151	351
W0RLX	**859,878**	**794**	**134**	**268**
W0NA	357,022	484	95	179

ALASKA

KL7RA	**1,946,487**	**2855**	**102**	**179**
KL7HKX	588,984	1342	84	100

BELIZE

V31A	**6,089,044**	**5424**	**146**	**494**

CANADA

VE2LJ	**2,460,843**	**2749**	**95**	**276**
VE7ZZZ	1,651,287	1898	130	233
VE7UBC	422,786	1080	72	89
VE3OXT	283,464	677	66	120
VE2UL	133,338	939	57	95

TURKS & CAICOS

VP5W	**4,841,910**	**5011**	**112**	**283**

AFRICA

CANARY ISLANDS

EA8AGD	**9,816,540**	**5763**	**144**	**426**

REPUBLIC OF SOUTH AFRICA

ZS1CT	**89,428**	**572**	**57**	**101**

ASIA

INDIA

VU2TEC	**275,064**	**640**	**52**	**105**

JAPAN

JE2YRD	**3,002,810**	**2300**	**153**	**314**
JA9YBA	**2,839,992**	**2316**	**149**	**289**
JA7YAA	**2,171,143**	**1839**	**154**	**289**
JA7YAB	2,090,735	1933	138	257
JA3YBF	1,879,570	1758	128	257
JA0YAK	1,684,088	1536	136	270
JF1YPF	1,599,345	1662	127	232
JH1YDT	1,558,832	1504	133	241
JE6ZIH	1,341,816	1440	119	224
JE3ZFS	1,214,301	1315	126	215
JA8YBY	799,663	1028	107	182
JR1ZTT	651,840	872	109	171
JA4YJA	468,384	754	91	147
JA7YFB	267,438	607	57	102
JH4YNT	191,646	405	73	116
JJ1ZXE	89,646	287	46	68
JA2YAC	33,852	148	47	46
JA2YEF	20,910	110	37	48
JA9YAA	8,234	80	19	27
JA1YAD	5,976	60	18	18

PEOPLES REPUBLIC OF CHINA

BY1PK	**1,441,035**	**2598**	**92**	**187**
BY4AA	338,751	1288	76	95
BY4SZ	107,107	578	51	40

SAUDI ARABIA

HZ1AB	**1,592,608**	**1974**	**94**	**220**

THAILAND

HS0A	**3,995,852**	**3525**	**158**	**374**

U.S.S.R

ASIATIC RUSSIA

UZ9AYA	**4,173,974**	**2629**	**150**	**412**
UZ0AXX	**3,371,411**	**2427**	**165**	**412**
UZ9SWY	**3,475,680**	**2295**	**147**	**410**
UZ0SWA	**2,592,990**	**2266**	**135**	**335**
UZ9CWW	**2,035,206**	**1602**	**124**	**335**
UZ9CWB	1,468,704	1315	115	305
UZ0QWA	947,961	1545	106	181
UZ0JWA	922,992	1448	95	173
UZ9AWD	852,222	1065	96	213
UZ0LWO	768,108	1218	88	165
RZ9OWA	702,047	1183	84	167
UZ0LWX	586,735	1349	95	120
UZ9SWT	370,200	681	57	143
UZ9XXM	366,930	583	69	174
UZ0FWD	303,100	1017	50	90
UZ9AWH	291,577	763	44	99
UZ0QWF	281,400	760	47	93
UZ0FWA	221,408	588	77	99
UZ0CWW	217,151	583	66	108
UZ9UWK	165,977	491	71	110
UZ9CYP	151,420	432	40	94
UZ0SXC	102,376	412	34	157
UZ9XWW	90,510	314	31	74
UZ9XWV	73,149	256	33	78
UZ9QWM	69,363	420	14	49
UZ0OWO	6,432	151	20	22

GEORGIA

RF0FWW	**772,464**	**1815**	**38**	**114**
UF7QWW	595,260	1171	47	133

KAZAKH

RL8PYL	**3,801,103**	**2958**	**145**	**402**
UL8BWW	1,120,862	1337	101	236
RL7PZZ	626,566	1008	90	167
UL8CWW	471,960	843	72	156
UL8CWA	446,050	654	90	185

EUROPE

BELGIUM

ON6AH	**968,951**	**1851**	**85**	**208**

BULGARIA

LZ9A	**5,886,114**	**4202**	**162**	**501**
LZ2KSQ	752,700	1151	89	236
LZ1KNP	634,172	1142	89	219
LZ1KRC	388,974	894	83	186
LZ1KHB	142,460	465	46	124
LZ1KTM	100,368	484	29	73
LZ1KKI	42,656	229	41	83

CZECHOSLOVAKIA

OK5R	**6,038,351**	**4046**	**164**	**503**
OK5W	**3,762,990**	**2747**	**155**	**475**
OK2KOD	428,993	936	80	191
OK2KMR	303,000	787	57	145
OK1KZD/P	188,672	642	47	129
OK3KGQ	133,750	696	32	93
OK1KGR	118,990	453	46	117
OK1KOJ	113,542	423	48	95
OK1KSZ	94,374	368	42	105
OK1OND	76,636	414	29	90
OK1OFM	62,192	255	36	68
OK1KTW	35,997	404	18	53
OK2KVI	33,066	182	28	71
OK2KNJ	31,296	177	31	65
OK1ONI/P	9,914	178	18	47
OK1KCF	9,577	86	21	40
OK3KYH	3,320	81	9	31
OK2KDS	1,260	16	15	15

DENMARK

OZ1ALS	**142,428**	**489**	**50**	**116**
OZ5EDR	94,180	234	58	112

FINLAND

OH7AB	**2,943,619**	**2273**	**146**	**407**
OF1AF	**2,908,053**	**2763**	**134**	**415**
OF2AQ	1,767,920	1739	124	316
OH2TI	1,205,933	1576	108	331
OF2BAH	980,976	1321	104	278
OH1AD	122,973	396	53	126

FRANCE

F5IN	**4,143,308**	**3415**	**145**	**414**
FF6KED	1,082,991	2002	88	185
FF6KPQ	228,238	887	46	93
F6ENV	69,495	320	36	87

FEDERAL REP. OF GERMANY

DJ4AX	**1,607,892**	**1894**	**116**	**313**
DK0MM	**1,532,321**	**1602**	**128**	**351**
DL6MAO	1,290,000	1309	118	312
DJ1OJ	1,193,184	1289	113	319
DK0OI	928,680	1429	99	256
DL7AEY	742,700	1274	95	255
DK9WI	569,296	1098	83	216
DF0XZ	470,958	656	88	230
DL0ER	256,368	609	67	151
DK0TZ	138,502	381	55	127

GERMAN DEMOCRATIC REP.

Y34K	**3,586,211**	**3434**	**134**	**389**
Y35L	**2,667,409**	**2872**	**135**	**368**
Y45CM	256,824	581	69	163
Y37CB	151,506	441	58	113
Y66CA	128,928	501	47	111
Y41CA	84,732	374	43	95
Y31CE	76,296	254	61	126
Y42CB	66,420	241	49	115

HUNGARY

HG5A	**5,787,055**	**4199**	**166**	**495**
HG6N	**4,973,020**	**3646**	**156**	**461**
HG9R	**4,452,630**	**3503**	**159**	**478**
HG1S	3,945,415	3919	136	379
HG7B	3,860,024	3220	157	445
HG8Q	3,365,782	2913	160	442
HA0KLE	1,711,138	2240	114	289
HG6V	1,567,384	2146	105	259
HA5KKC	1,322,014	1923	97	234
HA1KRR	1,235,400	2020	89	211
HA3KNA	1,221,292	1570	105	299
HA8KVK	1,044,142	1632	91	250
HA6KNX	374,400	662	74	186
HA6KZS	185,856	594	58	118
HA6KQD	89,376	256	48	99
HA1WD	17,766	296	12	42

ITALY

IK2EGL	**3,199,089**	**2690**	**137**	**362**
IY1TTM	2,808	48	15	24

LUXEMBOURG

G0AAA/LX	**4,538,229**	**4129**	**145**	**448**

NETHERLANDS

PA0KHS	**1,072,536**	**1585**	**90**	**258**
PA2DXY	834,426	1582	85	222
PI4DEC	99,750	498	35	98

POLAND

SP3GEM	**3,274,096**	**2720**	**153**	**421**
SP5PBE	1,796,896	2136	130	336
SP2ZFJ	1,727,384	1671	128	398
SP8KBM	1,242,180	1394	91	244
SP2PMO	467,921	787	86	207
SP2ZHB	384,648	1002	66	198
SP2KQU	311,190	803	64	182
SP7KWW	262,269	853	55	152
SP8PFI	54,392	370	26	78
SP9KUZ	48,384	328	30	82
SP9PKR	37,695	209	30	75
SP3KPN	169	7	6	7

SPAIN

EA3VY	**5,566,462**	**4209**	**152**	**449**
EA7TH	3,447,724	3775	113	300

SWEDEN

SL0CB	**949,696**	**1506**	**87**	**265**
SK5EU	821,353	1548	82	217
SM2JOR	176,386	995	25	61

SWITZERLAND

HB9CVQ	**909,585**	**1297**	**98**	**271**

YUGOSLAVIA

YU3AI	**2,494,392**	**2728**	**117**	**307**
YT3T	**2,511,885**	**2614**	**126**	**327**
YT2B	1,694,748	1769	122	322
4N2D	804,536	1405	82	186
YT5R	751,170	1280	90	253
YT4M	519,622	1101	75	214
YT4D	295,716	626	78	150
4N4D	43,957	389	45	68

U.S.S.R. EUROPEAN

BYELO-RUSSIA

UC1AWB	**1,038,750**	**1552**	**98**	**277**
UC1AWZ	397,188	773	84	222
UC1AWP	19,575	141	27	60

ESTONIA

UR1RWX	**3,332,196**	**2969**	**155**	**433**
UR1RXX	10,304	135	17	47

EUROPEAN RUSSIA

UZ1AWT	**1,444,732**	**1575**	**110**	**316**
UZ6LWZ	**1,295,361**	**1323**	**136**	**353**
UZ3AXX	**1,077,504**	**1801**	**100**	**284**
UZ1AWO	935,351	1724	91	270
UZ4FWA	923,238	1468	94	275
UZ4WWA	918,685	1345	111	286
UZ4WWB	900,729	1430	99	270
UZ3AWR	838,614	934	121	296
UZ3AXR	677,320	1198	86	242
UZ3WWW	550,848	1123	85	219
UZ1TWB	472,402	1039	71	216
UZ6LXP	252,213	640	66	157
UZ1CXF	151,081	352	57	134
RZ4HWW	141,723	455	57	124
UZ3QWM	134,748	523	60	111
UZ1OWJ	111,789	488	50	102
UZ1WWA	106,984	380	55	117
UZ6LXM	103,775	305	54	121
UZ4LXA	71,960	332	42	98
UZ3TYE	31,152	217	25	63
UZ3TZA	30,411	385	21	55
UZ6YWB	4,578	77	13	29
UZ1PWA	4,023	58	12	29

KARELIA

UZ1NWA	**439,218**	**1212**	**65**	**179**
UZ1NWF	249,429	825	50	133

LATVIA

UQ1GWW	**3,884,364**	**3056**	**149**	**463**

LITHUANIA

UP1BZA	**3,209,544**	**2453**	**167**	**481**
UP1BWW	**2,768,868**	**2355**	**147**	**434**
UP1BZG	2,286,564	2186	127	374
UP1BZO	1,906,205	1940	135	374
UP1BWG	963,852	1487	95	277
UP1BXR	831,514	1355	92	270
UP1BYC	777,060	1044	91	249
UP1BZQ	311,637	900	62	157
UP1BYK	225,776	656	52	154
UP1BZL	186,368	697	48	134
UP1BZM	164,980	470	62	164
UP1BZM/A	57,460	339	37	93

UKRAINE

UB4CWW	**1,692,240**	**1653**	**135**	**393**
UT4UXW	**1,547,289**	**2025**	**121**	**338**
UB4QWW	**1,490,952**	**2022**	**117**	**321**
UB3JWW	1,438,574	1651	77	161
UB4IZA	1,183,050	1388	125	325
UB4XWB	1,117,892	1187	111	308
UB4QWV	846,312	1169	108	286
UB4FWH	843,537	1454	85	232
UB4CXU	740,996	1381	80	209
UB4EXU	425,852	973	67	201
UB4JXT	393,087	918	82	201
UB3IWA	389,747	721	95	186
UB4FXX	295,625	616	74	201
UB4EYN	257,362	731	66	151
UT4UWL	200,518	505	61	144
UB4IWN	174,865	553	54	151
UB4WYA	144,312	525	39	129
UB4TWL	112,948	364	53	134
UB4LWY	98,826	238	56	125
UB0SZZ	90,576	550	39	109
UB4IWI	57,120	280	32	87
UB4MWU	56,769	263	39	110
UB4RWW	34,989	137	41	66
UB4WXZ	22,876	144	27	49
UB4FWC	13,900	245	8	42
UB4WZB	11,725	83	24	43
UB4CWA	9,620	78	12	40
UB4WWS	6,204	129	13	31
UB4WWA	1,488	58	10	14
UB4DWW	608	43	4	13

OCEANIA

HAWAII

NH6L	**2,092,128**	**3099**	**101**	**127**

INDONESIA

YB0ZAB	**331,354**	**580**	**75**	**122**

PHILIPPINES

DX1CW	**523,731**	**1020**	**71**	**98**

SOUTH AMERICA

NETHERLANDS ANTILLES

PJ2X	**741,295**	**1351**	**61**	**124**

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

UNITED STATES

W3LPL	**10,289,144**	**4778**	**188**	**569**
NR5M	**7,879,168**	**3911**	**186**	**518**
N4ZC	**5,405,537**	**3021**	**160**	**457**
K4VX/0	**5,364,112**	**2983**	**175**	**454**
N1CQ	**5,320,776**	**2930**	**163**	**473**
W3GM	**4,793,674**	**2626**	**166**	**468**
N6ND	**4,784,696**	**2868**	**177**	**425**
K4JPD	4,672,173	2577	175	458
W0AIH/9	**4,361,010**	**2734**	**168**	**410**
NB1H	3,587,553	2163	144	429
N3LR	1,487,409	1254	118	293
K1GW	356,670	470	87	183

ALASKA

NL7G	**7,225,672**	**6373**	**151**	**301**

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CANADA

VE3RCS		453,376	805	81 175

ST. LUCIA

J6DX		13,375,437	9833	149 428

US VIRGIN ISLANDS

KP2A		25,019,982	12387	188 595

AFRICA

CEUTA

EA9EA		23,425,035	11131	172 533

ASIA

JAPAN

JA3YKC		5,163,040	3527	161 368
JA2YKA		5,009,905	3464	164 351
JA1YXP		472,074	874	82 120
JE1YEM		214,120	380	91 121

EUROPE

CZECHOSLOVAKIA

OK7AA		11,980,725	7665	185 590

FEDERAL REP. OF GERMANY

DLØKF		4,771,602	4166	162 432
DA1WA		576,180	914	83 214

FINLAND

OH1AA		3,00,918	2766	132 386

LITHUANIA

UP7A		8,996,130	6563	172 530

LUXEMBOURG

LX9BV		8,747,440	7773	160 487

NETHERLANDS

PA6DX		6,928,293	6051	159 458
PA3ACA		330,484	842	75 184

YUGOSLAVIA

YZ1U		6,584,320	5286	151 489
YT2R		5,961,228	5217	159 459

OCEANIA

INDONESIA

YB4ZZ		18,921	128	20 31

QRP

VE7DX	A	687,690	1286	94 149
			(Opr. K7SS)	
YU3BC	"	512,148	888	81 149
			(Opr. YU3OH)	
G4ELZ	"	359,883	733	63 180
RT4UB	"	340,380	728	77 202
UB5WAB	"	310,764	525	83 199
LZ2QV	"	282,741	684	71 166
RA1AL	"	253,344	697	54 149
W8VSK	"	248,638	349	87 175
UA4LDJ	"	240,100	594	67 178
UD6DFF	"	227,700	434	62 136
DL8CM	"	213,048	524	56 142
UV3HD /UG5	"	212,250	472	35 115
WR4K	"	191,526	305	82 151
HA5KF	"	152,295	429	54 141
FB1LMJ /P	"	149,566	568	50 116
N1AFC	"	149,566	316	49 117
WB8IUK	"	142,623	246	70 137
KZ5Q	"	138,006	226	91 155
YU1LM	"	122,496	364	60 132
UW9CP	"	83,556	250	40 92
KH6CP/1	"	77,120	190	52 108
YO5BQ	"	75,150	323	40 92
Y21XC	"	74,520	335	37 101
WB6JHC	"	73,125	224	48 69
			(Opr. 4X1IF)	
OK1DKR	"	72,756	312	36 105
DK4CU	"	72,020	284	31 99
NU4B	"	70,437	177	54 105
ISØLYN	"	65,988	285	44 112
XF1C	"	63,336	548	32 26
OK3CUG	"	62,040	412	26 115
G4ETJ	"	59,520	298	26 94
IØKHP	"	52,264	217	38 101
PAØPUR	"	51,336	281	33 59
NØCNV	"	49,140	151	47 70
WB6JMS	"	42,312	139	59 64
K9EIJ	"	38,068	132	48 76
AD1C	"	32,034	114	41 73
DF7MV	"	31,490	209	22 45
NL7DU	"	31,482	198	31 35
W6VYK	"	29,232	154	38 34
CX8DT	"	29,100	113	42 55
W6LC	"	27,435	120	43 50
KL7GN	"	26,001	134	39 42
JH3TXP	"	25,620	117	35 49
YU2TY	"	22,325	129	31 64
KIØG	"	19,964	128	31 31
UV3TD	"	17,127	103	33 66
YO3BDP	"	17,100	132	24 66
UA9QCR	"	16,445	100	20 45
OK3CIB	"	16,300	173	22 53
N2GZL	"	13,608	82	29 55
G3LHJ	"	13,176	108	14 47
RB5EG	"	12,800	132	26 54
OK3DU	"	11,431	60	32 39
OK1DZD	"	9,435	82	18 33
UP2BNL	"	6,028	146	10 34
VE1NH	"	5,494	64	19 22
DJ5QK	"	4,984	80	14 42
Y24TG	"	2,075	31	12 13
N8CQA	"	1,856	66	33 47
PA3AFF	"	961	27	11 20
UC1WXD	"	939	34	7 19
N8AXA	"	493	12	7 10
YO3AIS	A	330	8	7 8
Y25SA	"	323	19	3 14
JA5DQH	"	242	11	11 11
EA3EGV	28	21,912	148	24 42
JR3RWB	"	14,694	103	23 39
JH1LBR	"	10,355	76	23 30
UAØSG	"	2,997	100	12 15
YO5AVN /3	"	1,581	20	13 18
OK1CZ	"	1,200	19	11 14
UA3ABT	"	828	19	9 14
YO2AQB	"	360	13	4 8
4Z4NUT	21	70,560	400	20 40
W5VGX	"	46,814	190	26 63
WØMHK /1	"	33,867	168	18 53
KS9U	"	32,200	126	26 66
WAØVBW	"	25,353	117	24 57
UA9SG	"	24,054	205	16 41
JAØCGI	"	23,940	149	25 38
K9PNG	"	14,940	88	19 41
RT4UN	"	9,027	76	20 31
JR2RJI	"	8,487	78	18 23
N8ITE	"	7,110	62	16 29
G3CWL	"	5,611	88	13 18
KA3CRC	"	4,290	50	7 23
Y23TL	"	836	18	8 14
JA2DN	14	88,725	321	33 72
IØSKK	"	51,760	393	23 57
W2HG	"	49,644	208	26 58
OK1AAW	"	46,822	279	25 57
W6DN	"	27,255	125	27 52
OZ3PE	"	20,644	201	14 38
UR2RFG	"	17,629	122	18 43
OK3CPY	"	7,344	104	15 33
G3DOP	"	4,806	112	7 6
PAØPLN	"	1,820	44	9 17
SP9CTW	7	61,100	334	24 76
VE7AHA	"	30,740	234	22 36
I4KRF	"	24,708	297	12 46
RB5GD	"	17,864	190	13 45
VE1AGZ	"	4,600	91	8 15
OK1DCP	"	2,550	49	7 27
JF2LTH	"	1134	26	10 8
K6ICS	"	765	21	8 7
SP6FXX	"	565	35	4 13
HA8KLB	3.5	23,968	400	9 47
OK1JJF	"	18,189	361	7 40
SP4GFG	"	16,192	356	8 38
OK2BIU	"	10,071	272	8 33
SP9KGM	"	6,630	193	5 29
OK1DSI	"	5,544	171	5 28
OK2SMO	"	5,544	168	5 28
AA2U	"	5,207	52	11 30
SP3DVF	"	3,472	113	4 27
Y25XA	"	2,772	79	5 28
Y28QH	"	2,108	69	4 27
YU7AE	"	1,025	36	6 19
JH4UYB	"	12	3	2 3
SP1GZF	1.8	10,176	202	8 40
OL1BRA	"	8,299	198	6 37
UM8MAA	"	4,620	88	7 21
OK1FXX	"	1,512	56	4 24
RV9CFA	"	1,071	28	6 11
OK2KHD	"	858	20	6 20
UB4LCB	"	782	43	4 13
YO3JW	"	598	25	5 18
Y24HM	"	561	36	3 14
UA9XIM	"	250	9	4 6

CHECK LOGS

Our thanks to the stations who sent in check logs: DJ3VC, EA1CYL, EA3CUU, EA4VA, EA5AIK, EA5DWS, EA5YU, EA7OM, EA8AVW, EA8RL, G3KZJ, GI5TK, GW3KYA, HAØLG, HA2EOA, HA5AHS, HA5KAA, HA6VA, HA7JB, HK3HHX, IK2DVG, JA6FYM, JE1CKA, JH4VRF, K3APM, KC3Q, KV8Q, LA2AB, LA2KD, LA2CQ, LA2KD, LA2Q, LA2QM, LA4NE, LA4NL, LA5QC, LA7SI, LA8CE, LA8XM, LA9ABA, LA9OI, LZ1KGB, LZ1LW, LZ1UH, LZ2AU, LZ2HK, LZ2JE, N2RT, N4IN, NB9C, OF3GZ, OH1XX, OH2BCD, OH2BSS/7, OH2NL, OH3TY, OH5FA, OH5LJ, OH5PT, OH6NH, OH7XE, OK1DMP, OK1DWG, OK1FTC, OK1JFP, OK1KDC/P, OK1KSL, OK1US, OK2BMA, OK2BSG, OK2PAY, OK2PKY, OK2PLH, OK2SAT, OK3CGN, OK3CQD, OK3CQR, OK3TRJ, OK4CPZ/MM, OY1CT, OZ1ABA, OZ1BUR, OZ1CAR, OZ1CBW, OZ1DPW, OZ1DXX, OZ1EUO, OZ1FGS, OZ1GHS, OZ1JLX, OZ1JNR, OZ2JI, OZ3Q, OZ4RS, OZ5PA, OZ5UR, OZ7BW, OZ7JU, OZ7L, OZ7OP, OZ8JD, PA3AAV, PA3AMA, PA3BBP, PA3BUD, PA3CNI, PA3DCS, PA3EKF, PY1OL, PY2QX, PY2WR, PY2YN, PY3CJI, RAØAR, RA1CE, RA3ALA, RA3AR, RA3ATM, RA3DAM, RA3DGR, RA3DIL, RA3DJA, RA3EA, RA3EF, RA4NBG, RA4SAE, RA6ALL, RA9XBL, RB5CB, RB5LSR, RB5ML, RB5QP, RB5UA, RB5VT, RD6DEQ, RM8MF, RT4UA, RT5UE, RVØYF, RW3AG, RW3DW, SKØRQ, SK6EI, SMØBFJ, SMØBTS, SMØCSX, SMØNUE, SM3CBR, SM3CVM, SM4AWC, SM4SET, SM5APS, SM5ARR, SM5FUG, SM5MLE, SM6BWQ, SM6CDN, SM6OEF, SM6OLL, SM6PVB, SM7ANB, SM7BAU, SM7KWE, SP1DMD, SP1EPP, SP2CMB, SP2DKI, SP2FAN, SP2FAP, SP2FAT, SP2FAV, SP2GBL, SP2GUB, SP2GUV, SP2HGG, SP2JGK, SP2US, SP3CDQ, SP3FLQ, SP3JIA, SP3LWP, SP4EEZ, SP4GHL, SP5ATO, SP5BYC, SP5CCC, SP5DIR, SP5DYO, SP5ENA, SP5ES, SP5GQX, SP5ILO, SP5JXK, SP5MBA, SP5TT, SP5YQ, SP6BEN, SP6HBW, SP6HEK, SP6HTX, SP6RVT, SP6SO, SP7EJS, SP8BVJ, SP8GSC, SP8JMA/A, SP9AIM, SP9BN, SP9DBA, SP9EMI, SP9HWN, SP9JPA, SP9JZT, SP9MZS, SP9ODY, SP9PDM, UAØABB, UAØFDX, UAØKBC, UAØKCJ, UAØLS, UAØQO, UAØSNB, UAØWAP, UAØZC, UA1AHX, UA1CCQ, UA1OEW, UA1OFT, UA1OLL, UA1WEN, UA2FGA, UA3AAJ, UA3ACJ, UA3AGW, UA3ALG, UA3AQO, UA3DAT, UA3DEV, UA3DFV, UA3DOL, UA3DSP, UA3DTT, UA3ECQ, UA3EDH, UA3EDP, UA3IAK, UA3IHY, UA3LCC, UA3MED, UA3NU, UA3PDW, UA3QAM, UA3RAJ, UA3RM, UA3UAR, UA3UAY, UA3UCD, UA3WI, UA3XBY, UA3XCQ, UA4FDD, UA4HJA, UA4HJK, UA4HMC, UA4HML, UA4NC, UA4NCI, UA4WAP, UA4YCJ, UA4YZ, UA6AUT, UA6HNU, UA6HOF, UA6LCT, UA6YW, UA9AKS, UA9AKW, UA9FEE, UA9FFE, UA9FIU, UA9MAC, UA9OJ, UA9QQ, UA9UPG, UB4IE, UB4JWZ, UB4LDD, UB4QYT, UB4WZA, UB5CAL, UB5IAL, UB5IE, UB5JPX, UB5JX, UB5KAF, UB5KV, UB5KW, UB5MQS, UB5QGD, UB5QJA, UB5QVE, UB5UCH, UB5XCU, UB5ZY, UC2AAD, UC2AAN, UC2AS, UC2IDG, UC2LB, UH8DC, UL7BF, UL7BW, UL7JCP, UL7NR, UL7TJ, UL7YAD, UM8MY, UO4OZZ, UO5OOW, UP1BXF, UP2BEI, UQ1GXX, UQ2GGE, UQ2GLY, UQ2GMC, UQ2GOU, UR2RNA, UR2ZN, UT4UB, UT4UH, UT4UW, UT5CF, UT5UAZ, UT5UDI, UT5UFI, UVØBB, UV3DAV, UV3DFL, UV3DN, UV9WN, UW1OR, UW3EG, UW3PK, UW3PN, UW4CN, UW6HO, UW9CM, UW9PT, UW9UWU, UY5GG, UY5UV, UZØKWC, UZØQXU, UZ1AXB, UZ3AZG, UZ3PXR, UZ4SWW, UZ6HR, UZ9OWE, VE1ACK, VE3OMU, VE7ACM, VP9AD, W2LPV, W5AWT, WBØGOB, Y21AE, Y21FA, Y21IC, Y21DG/A, Y21XH/A, Y22CF, Y22DG, Y22FK, Y22KM, Y22TF, Y22UB, Y22YF, Y22YJ, Y23BF, Y23PF, Y23YE, Y24CG, Y24EA, Y24FA, Y24IK, Y24MJ, Y24SG, Y24VK, Y24WJ, Y24XD, Y25GH, Y25IJ, Y25MG/A, Y26SO, Y26VH, Y26WL, Y26WM, Y26XM, Y27GL, Y27KO, Y27YH/A, Y32EK, Y33VL, Y35SM, Y35VG, Y36SG, Y37XO, Y38TB, Y41YM, Y42WB, Y43RJ, Y45RJ, Y45TJ, Y44ZB/Y47RO, Y53UL, Y53YN, Y54OL, Y54XL, Y54ZA, Y55NA, Y55UG, Y55XD, Y56ZN, Y57YL, Y57ZL, Y61XM, Y67TG, Y73XH, Y87VL, YO3AC, YO5BLA, YO5DPA, YO5NU, YO5TA, YO7BSN, YO8BOI, YT2GT, YU2CMC, YU7LL.

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CQ REVIEWS

Ten-Tec Equipment Enclosures

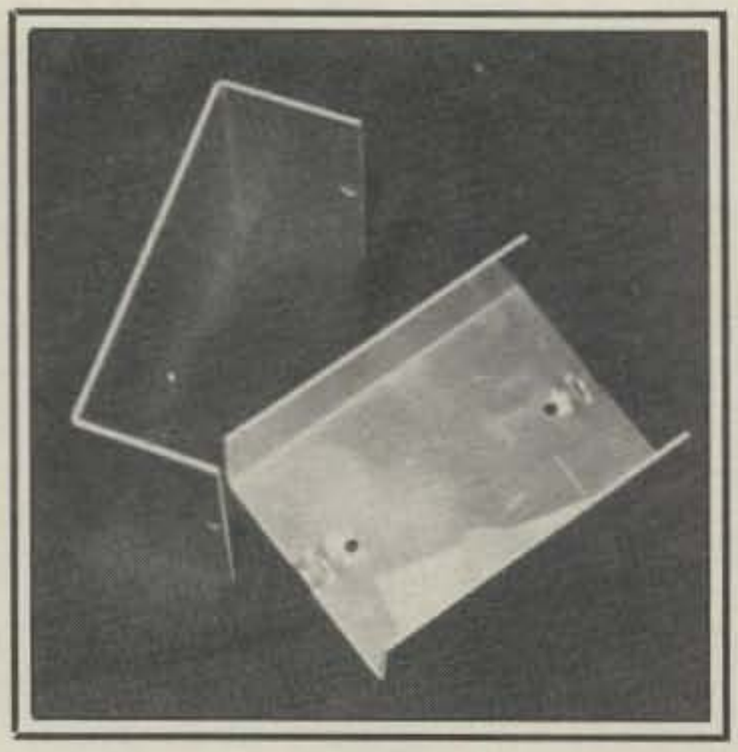
BY JOHN J. SCHULTZ*, W4FA/SV0DX

Ten-Tec in some of their transceiver advertisements sometimes uses the phrase "America's best kept secret." Well, that may be true regarding their transceivers, although I seriously doubt it, but if anything it is doubly true regarding their electronic equipment enclosures. Ten-Tec has been a major manufacturer of equipment enclosures for years. They have literally thousands of types of enclosures in just about any size, form, or color scheme. Their main business has been, and still is, to cater to electronic equipment manufacturers who might order a specific enclosure with specific size and finish specifications and with complete hole punching specified for component mounting. Just to give you an idea of what that sort of business means, a small order is considered to be 50 or more units, a medium order is 1,000 units, and they consider it economical to set up with permanent type tools for hole punching if an order is at least 2,000 to 3,000 units!

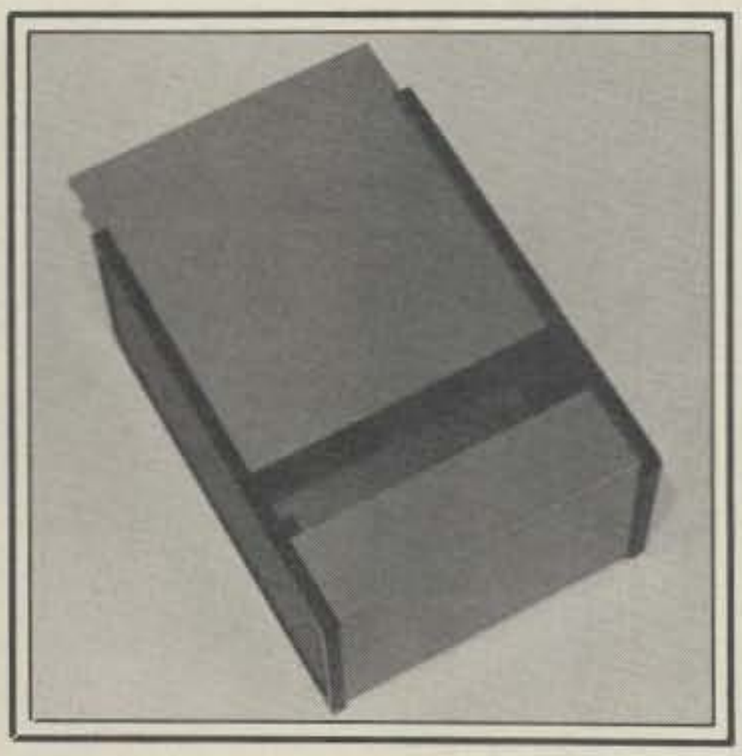
Ten-Tec has never hidden their enclosure line from the amateur radio world, but then again, they have never advertised their enclosure line with any vigor in amateur radio publications, since their main business regarding enclosures is, obviously, with equipment manufacturers. I therefore was very pleased that after some communication with Ten-Tec they not only agreed to this review, but also agreed to make their standard non-punched enclosures available to amateurs at single-unit OEM (original equipment manufacturer) prices.

The enclosures available from Ten-Tec cover such a wide range that it boggles the mind of the average home brewer who has to contend with a few standard sizes available through mail-order outlets or retail outlets such as Radio Shack. I'll try to simplify the description of the enclosure line by grouping them as bare-bones simple, utility types, rugged utility types, and specialized deluxe. The price range covered is from about $2.00 for small, unpainted aluminum enclosures to $150.00 for large, deluxe enclosures with carrying handles. I think that what I term "utility" types of enclosures will be of main interest to *CQ* readers, so I'll describe a few of those types first with just a brief look at the "bare-bones simple" and "rugged utility" types. Any reader can take a look at the full range of Ten-Tec enclosures by requesting a copy of their free "Equipment Enclosures" catalog (Ten-Tec, Highway 411 East, Sevierville, TN 37862).

c/o CQ magazine



Ten-Tec's TP series are simple two-piece enclosures that nest together. They are made of 16-gauge aluminum.



An enclosure from the L series. In this case, it is the LG-5, which has exterior dimensions of 3¼"H × 5¼"W × 7"D.

Bare-Bones Simple

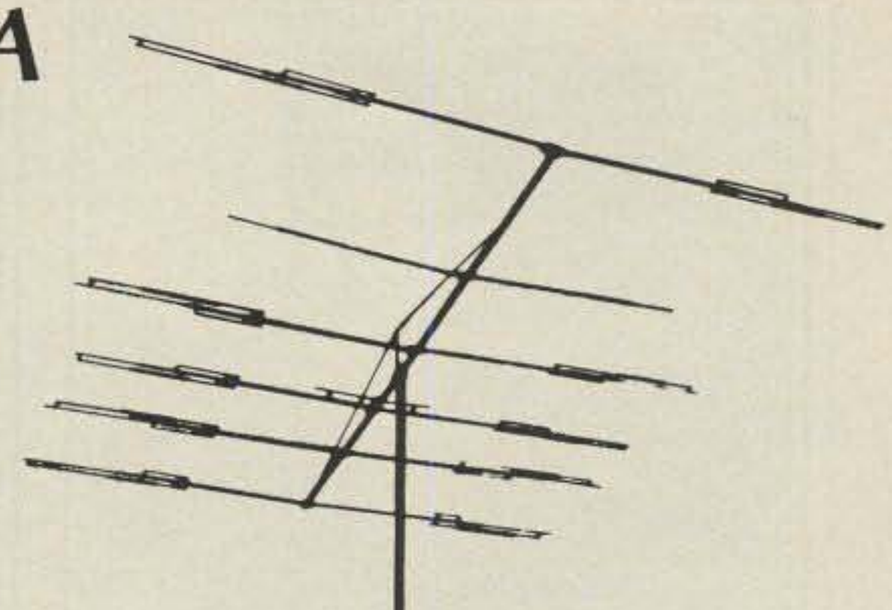
These are simple, unpainted enclosures made from heavy 16-gauge aluminum. They consist of a "U"-shaped top cover and "U"-shaped main chassis that nest together and that are secured together by two sheet-metal screws. The top cover provides a bit of overhang towards the front and rear panels of the chassis unit for an attractive appearance. A photograph shows one of the enclosures. They range in size (HWD) from 1" × 3" × 2" to 3⅜" × 8¼" × 6⅜". There are a total of 20 different sizes, and the unit prices range from $2.17 to $6.76. Ten-Tec designates them their TP series.

The TP enclosures can be used for almost any homebrew electronic project: control units, keyers, audio devices, tuners, etc. I found the 16-gauge aluminum thickness to be an excellent choice. It is easy enough to drill or hole punch but yet not so thin that the finished enclosure looks flimsy. The unpainted nature of the enclosures allows various options for their exterior finish. You can leave them unpainted, wire brush one or both parts of the enclosures for a textured look, paint both parts one color, or paint each part a different but complementing color for a custom appearance.

"Utility" Enclosures

There are over 98 different models in what I have termed Ten-Tec's "utility" enclosures. I expect the people at Ten-Tec might cringe a bit at my choice of the word "utility." I choose it more to indicate the almost universal usefulness of the enclosures rather than to suggest they have a plain appearance. In fact, there is nothing at all plain about them. They are all finished enclosures of either all-metal or metal/plastic construction. Some have painted and baked metal surfaces only, while other enclosures combine vinyl-clad metal surfaces with smooth, painted surfaces. Still others combine smooth, painted metal surfaces with wood grain or textured plastic side panels. Ten-Tec designates them as their Series S, H, V, D, F, M, L, J, and T. They range in size from roughly 4¼" × 2" × 4⅛" to 4½" × 10½" × 14". I say roughly with regard to size because some of the

Best Amateur Tribanders Available — KT-34A/KT-34XA*



SPECIFICATIONS — KT-34XA

ELECTRICAL

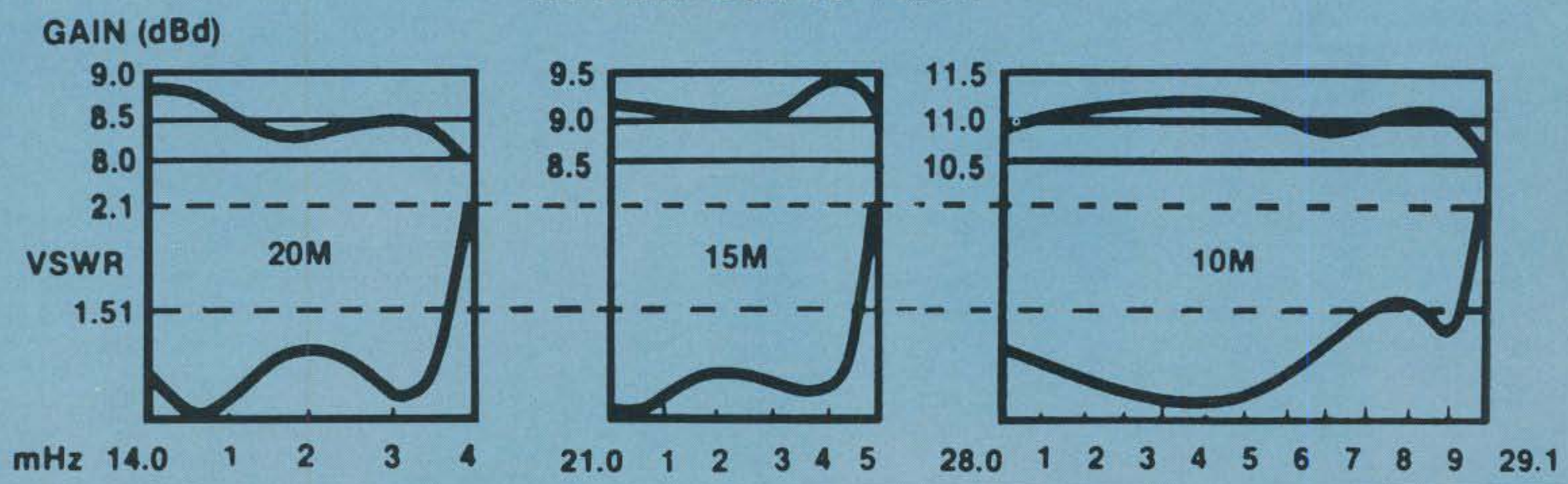
- Bandwidth ..... 14.0-14.350 MHz
  21.0-21.450 MHz
  28-29.7 MHz
- Gain ..... 8.5-9 dB
  9-9.5 dB
  11-11.3 dB
- VSWR 1.5:1
- F/B ..... 20 dB
- F/S ..... 40 dB
- Feed Imp ..... 50 Ohms with balun
- Balun ..... 4:1, 5 kW PEP

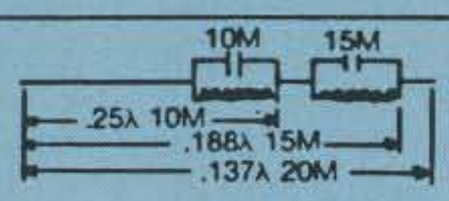
MECHANICAL

- Element Length ..... 24 ft.
- Boom Length ..... 32 ft.
- Turn Radius ..... 21.5 ft.
- Windload ..... 9 sq. ft.
- Weight ..... 68 lbs.
- Mast ..... 2 in. O.D.

*Lack of space or funds? How about a KT-34A? It's upgradable to a KT-34XA and similar in performance!

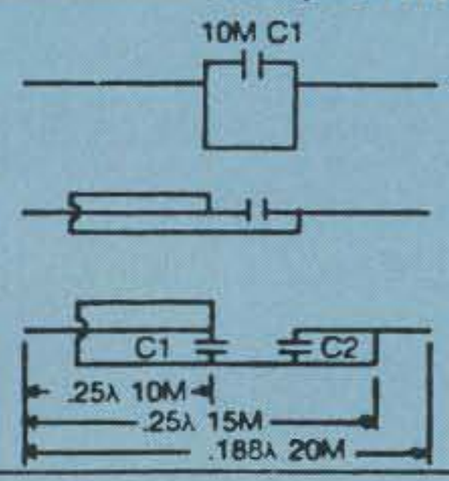
KT-34XA Gain vs. VSWR





Conventional tribander element

Development of the KT-34XA Element



1. Replace coils with lossless linear loading
2. Fold back and symmetrically place linear loading for mechanical strength and balance.
3. Extend element to 1/4 wave on 15M. Fold back and decouple tip with C2.
4. Extend tip for 20M. Tuning of 15 and 20M is independent.

The KT-34XA's design represents the first major advancement in tribander technology in over 20 years! The conventional traps, coils, and capacitors have been discarded in favor of integral linear loading and hi-Q air capacitors, all composed of aluminum tubing. These give the KT-34XA a conservative power handling capability of 5KW PEP and an unusually high level of operating efficiency. Linear loading also makes full ¼-wave elements possible on 10 and 15 meters, and brings 20 meters much closer to the desirable ¼-wave than any conventional tribander. The etch above diagrams the profound differences between the KT-34XA and a typical tribander element and the electrical activity of its various sections. Note also the lower windloading profile!

21 Jan.-1988

Mr. W.M. Scott
Mirage/KLM
P. O. Box 1000
Morgan Hill, Ca. 95037

Hello Scotty

Just want you to know that once again your KJ34XA is the king of the 10/15/20 meter bands!

In 1987, just closed, I worked 268 countries on 10/15/20 SSB with your KJ34XA - and this was done in only 11 months - (since I spent October in China at BY4RA and BY4AOM in Shanghai - away from my home qth.) -congratulations, Scotty, on providing the finest tri-bander available anywhere — ... and you can quote me!

73/Ken Miller
KG9R/3

(See the Feb. issue of S.E.R.A. Repeater Journal's "Dream Farm" story — reprints available).

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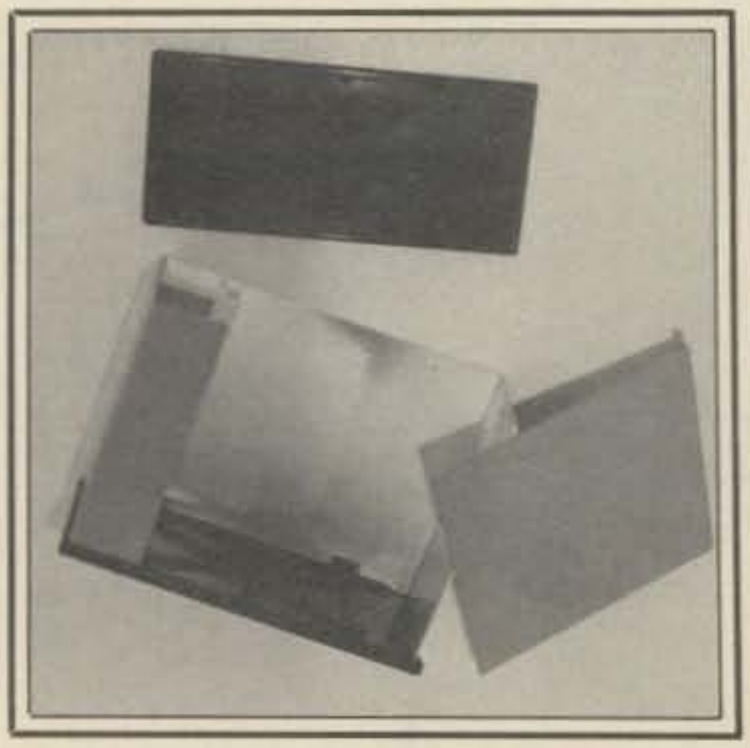
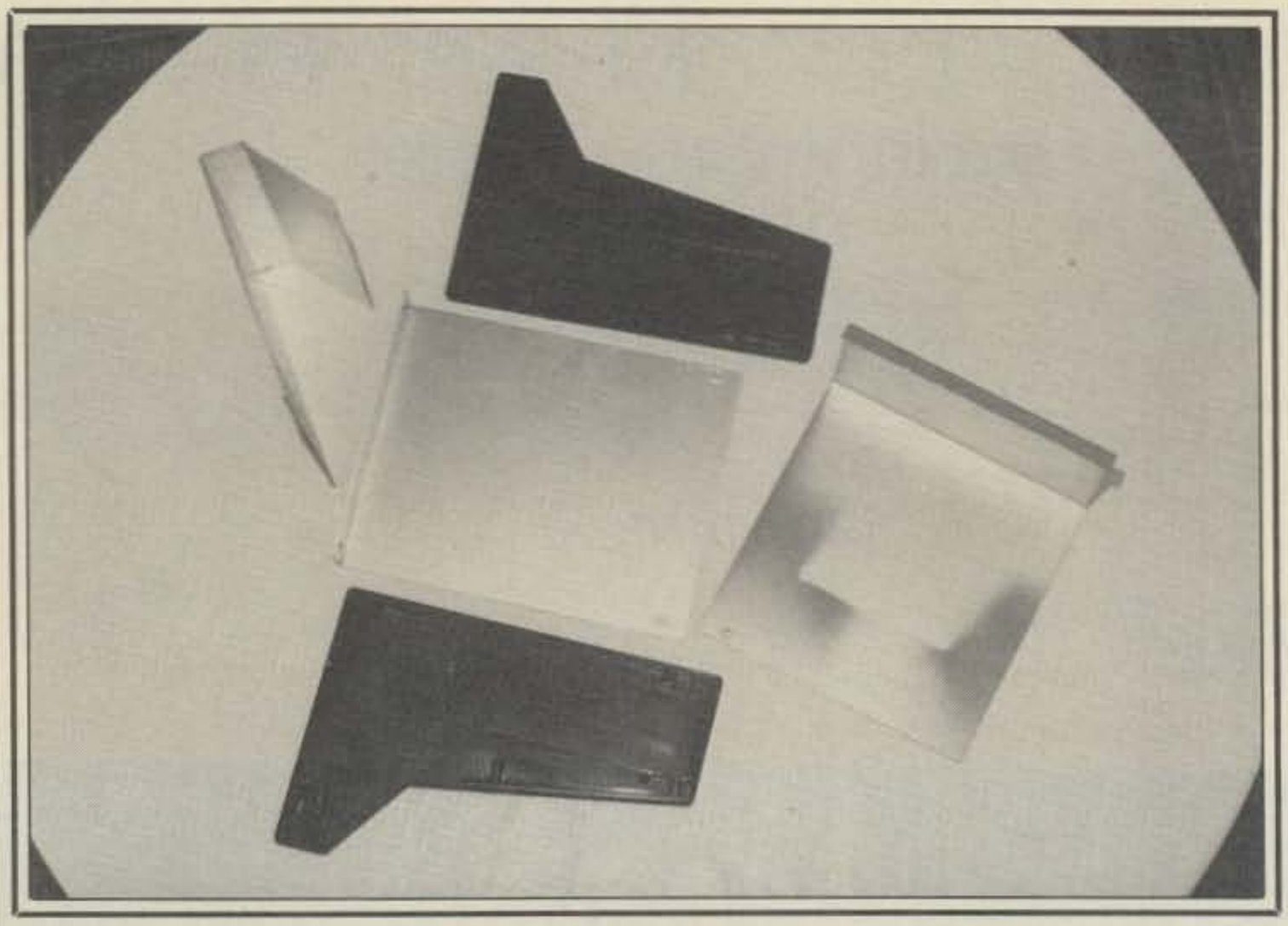
CIRCLE 2 ON READER SERVICE CARD



The LG-5 disassembled to show the two metal and two plastic components.



The HG-5 enclosure broken down.

enclosures are squarish in shape while others have up to two sloping panels. The price range is $5.20 to $23.30, but with most being below $12.00. Just three samples from the extensive series of enclosures will be presented.

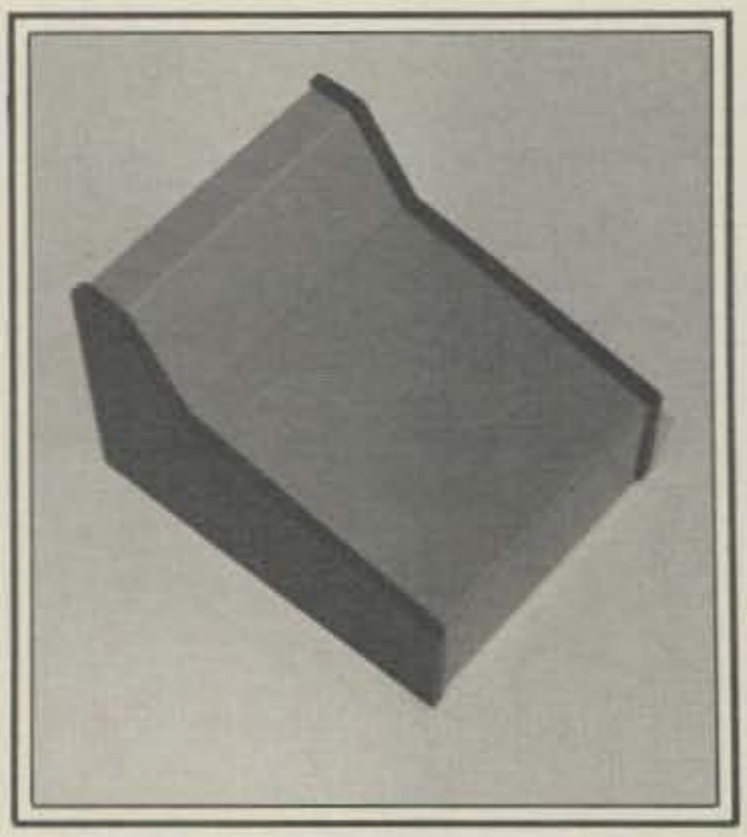
As you can see from a photograph, the L series features two- piece metal construction with two plastic side panels. The top metal cover can slide backward from the enclosure. If you look at the photograph showing the enclosure disassembled, you can see that there is complete access to the metal portion which constitutes the bottom, front, and rear panels to facilitate the drilling/punching of holes and the mounting of components. Although the side panels are made of plastic, the enclosure can be completely shielded. Some manufacturers who actually use these enclosures accomplish this by spraying the inside of the plastic side panels with a conductive coating. Others use copper-foil cutouts on the inside of the panels making sure they contact the main metal part of the enclosure. Either approach is satisfactory, although home-brewers will probably find the copper-foil technique the easiest one to use when a project requires complete shielding.

This type of enclosure is probably the best all-around one for most home-brew projects since it combines a very attractive appearance with reasonable cost and is easy to "work" with regard to component mounting.

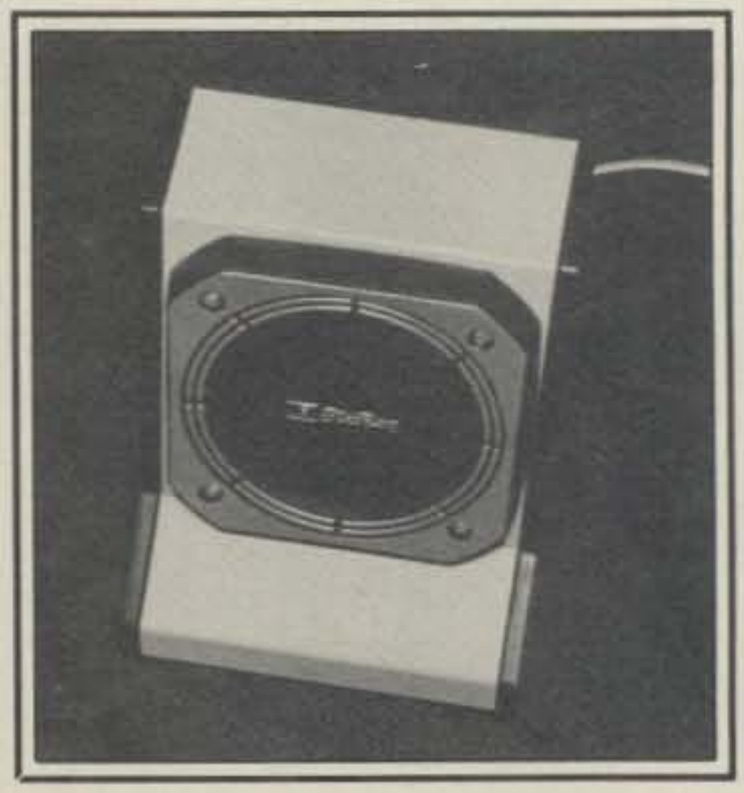
The D, F, M, and J series are all variations on the same type of enclosure but with different finishes and in various size ranges. The F and J series, for instance, are all slightly less than 2½ inches tall and are well suited for small or large PC boards. The D and M series are all slightly less than 4½ inches high and are well suited for all types of antenna-tuner projects. All of the enclosures are supplied with assembly screws and self-adhesive feet.

The H and V series are similar to the series just described but they have three metal parts and two plastic parts for the side panels. Some photographs show an H-series enclosure both in its assembled and disassembled form. These enclosures have two sloping front panels and are ideally suited for control- or measuring-type devices where the controls might be on one panel and indicating devices such as lamps or meters on the other panel. Depending upon a given application, you can emphasize the display or control aspect by having large-size meters combined with a small control-panel layout or the other way around. As you can see from the disassembled unit, all of the metal panels can readily be accessed for metal working or for the mounting of components. These series of enclosures have standardized height and depth dimensions but come in widths ranging from 5 to 10⅛ inches.

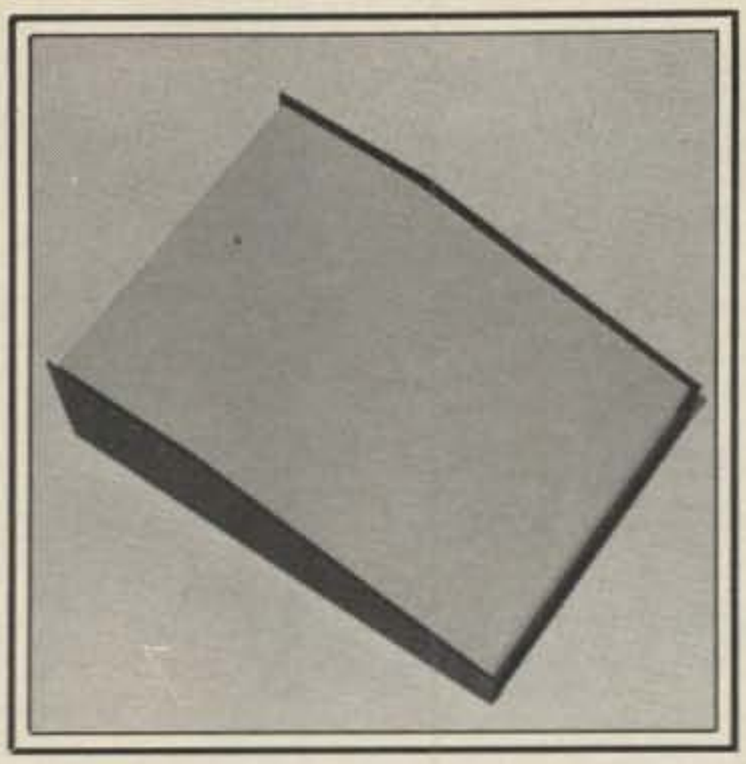
The S series are two-piece all-metal enclosures with a 15 degree sloping front panel. They are designed mainly for larger- size projects such as high-density readouts, switch clusters, or keyboards. They come in widths from 6½ to 14 inches with a standard depth of 9¼



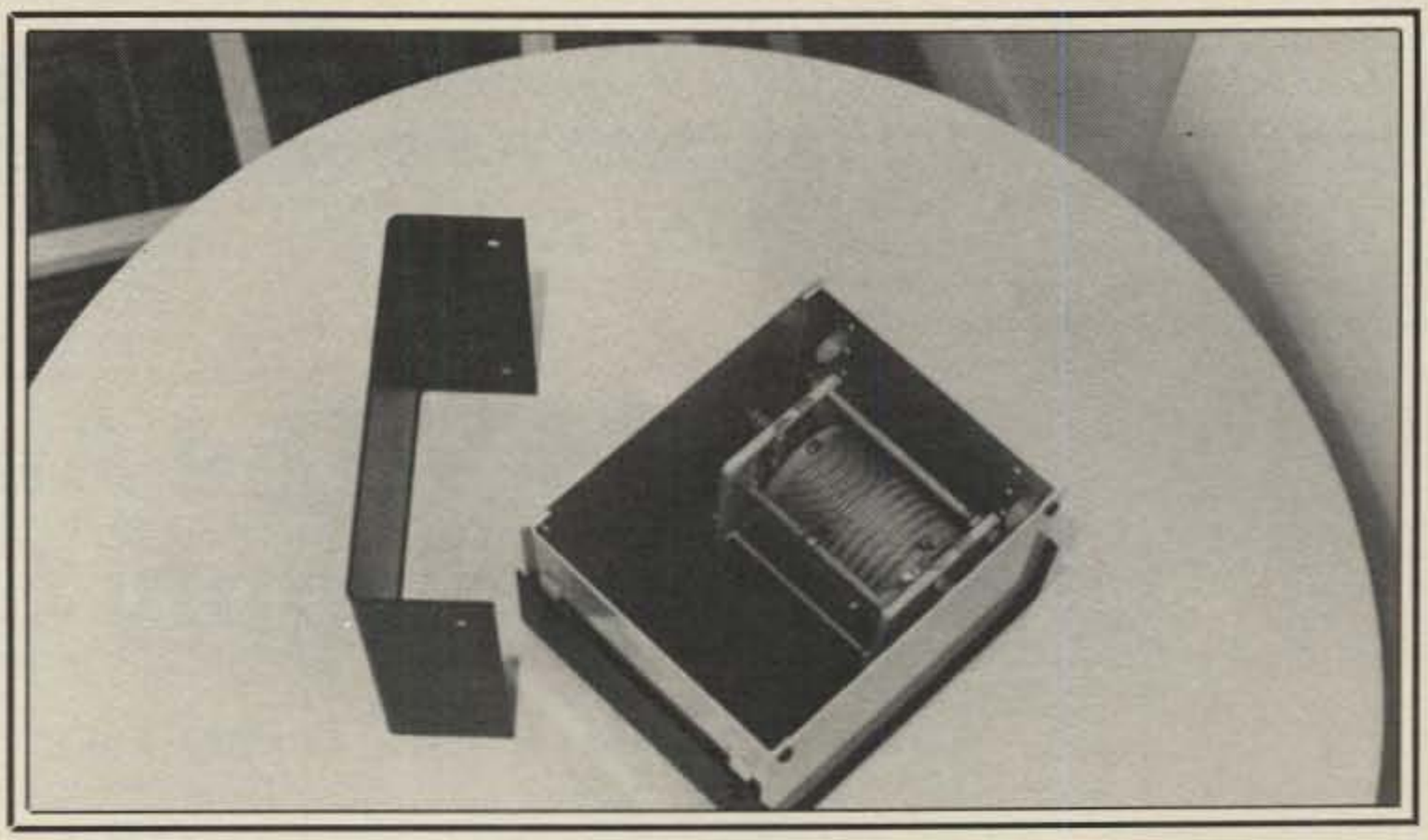
An enclosure from the H series. In this case, it is the HG-5, which is roughly 5 inches wide and 6 inches deep, with the front being 2 inches high and the rear 4½ inches high.



If you take the H series and stand it on its rear panel, you get an idea of the V series. In this case, an HG-5 enclosure was used to mount a loud speaker. An internal amplifier will be added later with controls on the panel below the speaker grill.



An S series unit in assembled form.



Sizing up how the roller inductor part of an antenna tuner project would fit in a Series B type enclosure.

The S series units are all of two-part metal construction.

inches. A set of photographs shows one of the units assembled and disassembled.

Rugged Utility Enclosures

The Series B or "Constructo" series from Ten-Tec are what I would call heavy-duty enclosures. They are of all-metal construction with interior aluminum panels on all four sides but with rolled steel top and bottom covers which encase the interior panels, except for the front and back panels. In spite of the battleship-like construction, the units are quite attractive since the outer steel covers have a textured blue or black enamel finish while the front and rear panels have an egg-shell-colored baked-enamel finish. The enclosures come with an adjustable height chassis for the internal mounting of PC boards, etc. The series B units come in heights of 2½ to 5½ inches, widths of 6 to 12 inches, and depths of 5 to 9 inches. Prices are in the $20 to $30 range.

The B series are probably a bit expensive for most run-of- the-mill home-brew projects. However, if you have some sort of ultimate project in mind or want to build a super-rugged antenna tuner or switching unit, the series deserves to be kept in mind.

Summary

As the phrase goes, we only covered the "tip of the iceberg" as far as Ten-Tec enclosures are concerned, especially since only a few models could be presented and only with black- and-white photographs. But if you like to home-brew now and then, be it a simple switch unit or a complete transceiver, and want to put the project in something more than a plastic box, you surely should consider a Ten-Tec enclosure. CQ

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RFC 2-217, 2W in = 170 out
RFC 2-117, 10W in = 170 out
RFC 2-317, 30W in = 170 out
RFC 2-417, 45W in = 170 out

220 MHz Amps
RFC 3-22, 2W in = 20 out
RFC 3-211, 2W in = 110 out
RFC 3-112, 10W in = 120 out
RFC 3-312, 30W in = 120 out

440 MHz Amps
RFC 4-32, 3W in = 20 out
RFC 4-310, 30W in = 100 out
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Please send all reader inquiries directly.

Interested in collecting/restoring vintage radios and memorabilia? Here's a great place to visit, or you can send for their catalog.

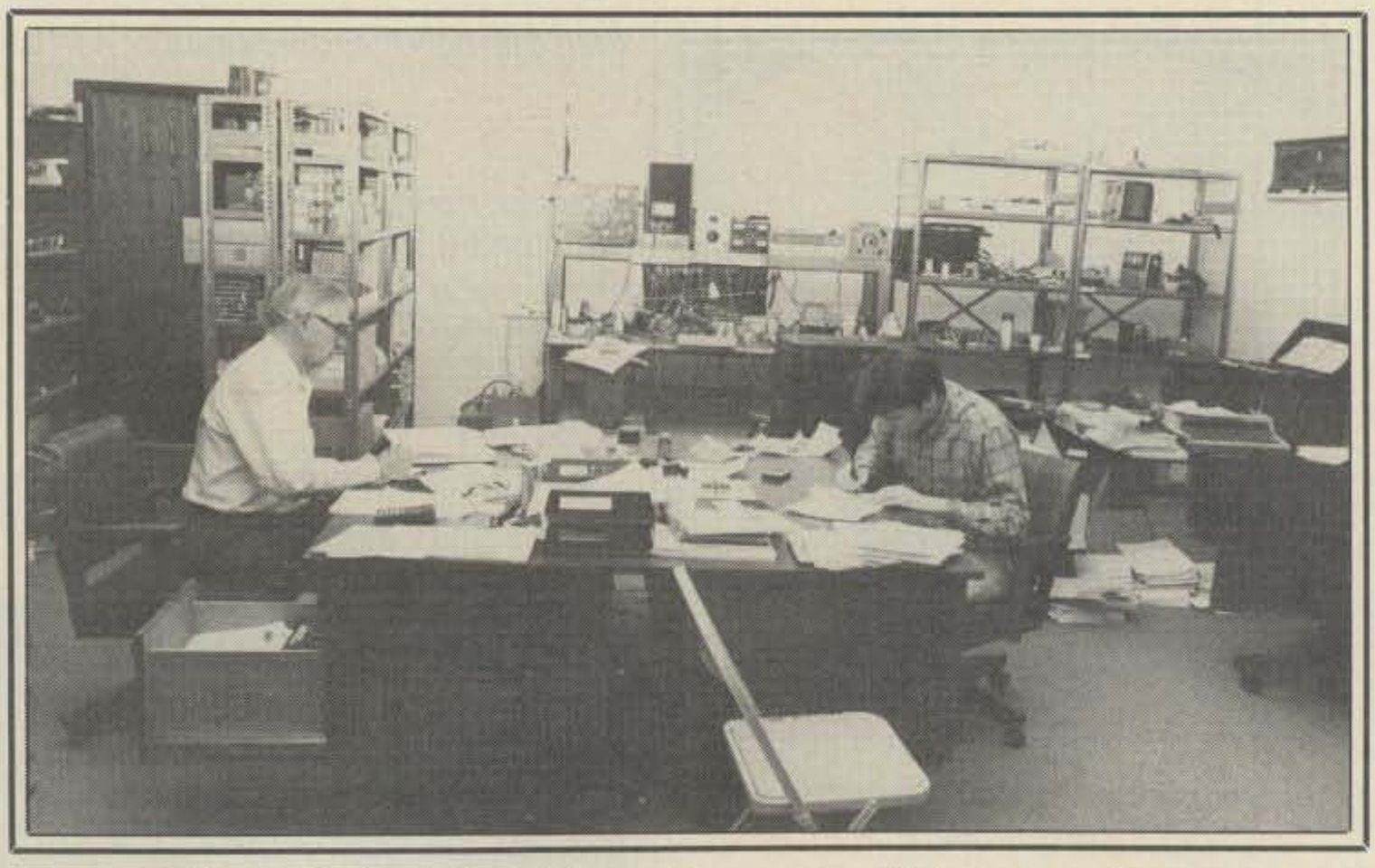
A Visit To The Antique Electronic Supply Company

BY KEITH A. KUNDE*, K8KK

Like many of the readers of *CQ*, I have an incurable addiction to electronics. I acquired this peculiar habit as a youngster, in the days before television had become a household commodity. Radio was the chief electronic entertainment then, and nearly every home had a piece of talking furniture in the living room. My family had one of those big console sets with a fancy veneered cabinet and a nifty "Magic Eye" tuning indicator that gave off a beautiful green light, especially on strong stations. I used to squeeze in behind it to peer at the dusty chassis with its many glowing tubes, mystified at how voices and music came out of there (and getting my face toasted in the process!). My uncle, Norm Kamms, noticed my interest in radio and encouraged me to learn more about it. I began reading about electricity and electronics, and that led to experimentation and building, and, well, I was hooked!

Some years have passed since then, but I've retained my strong interest in electronics (including amateur radio, of course!). So it shouldn't surprise anyone to learn that whenever I travel, I take some time to search the local telephone directories for any electronic emporiums which might be in the vicinity. I was doing just that on a trip to my grandmother's home near Phoenix, Arizona, when I discovered a most interesting ad. It was from the Antique Radio and Tube Company in Tempe, Arizona, just southeast of Phoenix. They were advertising tubes, parts, supplies, and books for use in repairing or restoring tube radios and other tube equipment. However, the line that grabbed me said, "Over 150 radios on display in our showroom." Wow! A nostalgic notion came over me. I didn't know if I wanted to do anything with an old radio, but it couldn't hurt to go look, could it?

**8355 Dalepoint Rd., Independence, OH 44131*



George Fathauer, Sr. (on left) and his son George, Jr. at their stations. The service area can be seen in the background.

In a few minutes my grandmother and I were on our way to Tempe.

Not far from the Phoenix Airport we took our leave from the thundering herd on the freeway and turned east onto the uncrowded lanes of University Drive. That area of Tempe is a mix of older and newer buildings, and I was amused to find the Antique Radio and Tube Company imbedded in a row of new shops (since my visit, the company has changed its name to Antique Electronic Supply, and has moved to brand-new larger quarters (688 West First Street, Tempe, AZ 85281, telephone 602-894-9503).

Upon entering the shop, I was delighted to find a beautiful showroom loaded with dozens and dozens of radios of many makes and vintages, from the earliest crystal sets to some quite recent models. Tabletop sets and old horn-type loudspeakers crowded the shelves lining the walls, while console models stood in elegant rows in the center of the room.

Racks of books and magazines (some antique in their own right) were on display. I selected an October 1926 issue of *Radio News* magazine priced at $8.00 (absolutely fascinating reading!). Also in the racks were some very thick 78 rpm phonograph records bearing the "Edison" label. One, with renditions of "Satisfied" and "Read'Em and Weep" by Al Bernard and Ernie Hare, was offered at $4.00. (All prices were as of my visit a while back, and as with all things prices are subject to change.) An early Edison-type cylinder record player with a collection of cylinder recordings sat on a low table by the door, right next to modern cassette recordings of old radio broadcasts.

Brand-new one-tube receiver kits from 1946 (tube and earphone included) went for $8.75 (these are sold out now, but a version assembled from newer components is available). My grandmother found a set familiar to her, an Atwater

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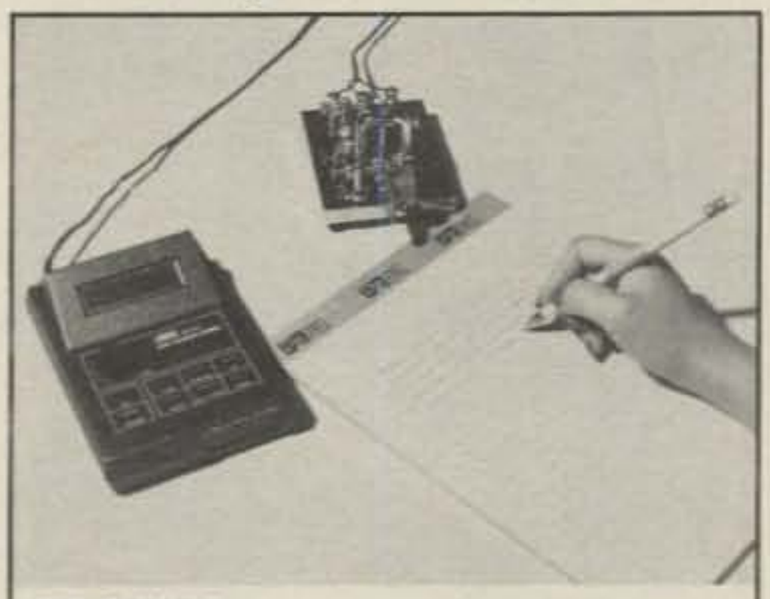
Only—$229.00

DECODER

Input level	• 10mV to 2V RMS.
Input impedance	• 8 to 1kΩ—600Ω typical
Decoding speed	• 5 WPM to 30 WPM
Audio filter	• 800 Hz ± 80 Hz Active and PLL filters 700 Hz to 900 Hz internally adjustable.



TRAINER

Code generator	• Random code generator 5 characters/code group
Speed	• 5 WPM to 30 WPM 1 WPM increment

ELECTRONIC KEYER

Paddle input	• TTL level —LO/Actuating, HI/Stop Contact input —ON/Actuating, OFF/Stop
Key input	• TTL level —LO/Mark, HI/Space Contact input —ON/Mark, OFF/Space
Keying speed	• 5 WPM to 30 WPM 1 WPM increment
Keyer output	• Transistor switching, Open collector type

SPECIFICATIONS

Model	• AR-501 Radio telegraph terminal
Power source	• DC 12V to 13.8V—165mA
Size	• 4.5"-W x 2.24"-H x 6.25"-D
Weight	• 12.5 oz. (358 g)
Controls	• Power On/Off • Random code generator On/Off • Print-out On/Off • Monitor speaker level • Electronic keyer mode select • Speed Up & Down
Display	• LCD 32 characters—16 per line
Indicators	• Power On—Green LED • Tuning—Red LED
Front connections	• Paddle—Standard/Iambic • Ordinary telegraphic key • Headphone/Earphone
Rear connections	• DC 13.8V input • Audio input • External speaker • Keyer output • Printer output

PRINTER PORT

• Compatible with Centronics 8-bit parallel printer. At least 4K byte data buffer is required in a printer.

BACK TO BASICS — • — • But far more advanced — — • —

The AR-501, triple mode CW terminal in a small package, is a powerful gear to practice and play with. For the Novice, SWL and Amateur radio operators it detects Morse code between 5 to 30WPM. Just plug the AR-501 to your receiver to start translating the Morse code onto full 32 character LCD display. Very simple and easy to operate. You ask; for code practice?, both receive and transmit? Yes, the AR-501 does just that. It will improve your cord reception and keying technique at the speed you want. More?. it operates as an electronic keyer both standard and iambic. More Yet? How about a printer port? You bet, the AR-501 provides parallel printer port for hard copy. You can Log the QSO, and Practice. It will help you immeasureably. We even offer a standalone Nicad operated thermal printer as an option. **ACCESSORIES SUPPLIED:** The AR-501 Radio telegraph terminal comes complete with Receiver cable, DC Power cable, Miniature Phone plug, Miniature stereo phone plug, Spare fuse, Wall receptacle style power adaptor and Instruction manual. **ACCESSORIES AVAILABLE:** CC-501 Parallel printer cable — **$30.00**/DPU-411 Standalone Thermal printer with 8K buffer.—**$235.00**

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CIRCLE 96 ON READER SERVICE CARD

A small part of the tube inventory at Antique Electronic Supply. These are some of the earlier types, including many varieties of the popular '01A.

Kent built in the late '20s, which was tagged at $120. Nearby a box of assorted old headphones available for a few dollars each sat on top of a big Zenith radio-phonograph console. A collection of rare antique tubes mounted in a display case carried a price intended for the serious collector. The ubiquitous Philco cathedral top was there (the real thing, not a plastic reproduction), along with many other sets with brand names such as Airline, Jewel, Freed-Eisemann, Magnavox, Silvertone, King, and Miracle. Some sets produced in the '40s and '50s were remarkably low-priced, while the scarce models from the early days naturally demanded steeper tariffs.

At the back of the showroom area a glass display case and counter held an array of radio memorabilia and collectibles. Among them were old-style clear-glass lamps, some telegraph equipment, a Jim Beam "Cathedral Top" bourbon bottle, a set of RCA's mascot "Nipper" salt-and-pepper shakers, and more Edison phonograph cylinders.

Behind the counter was an open-office/repair-bench area. Seated at desks facing each other were George A. Fathauer, manager of the enterprise, and George H. Fathauer, his father and consultant to the business. Both were engrossed in paperwork. Lucy, their secretary, churned out typewritten correspondence at her nearby desk.

"When did you say that order for square bus wire was due?" asked George Sr.

His son replied, "Three months," without looking up from his labors.

"More like six months, " muttered his father, reading from a manufacturer's invoice.

George Jr. looked up, obviously bothered by the news. "That's cutting it close. Our new catalog will be out by then."

I interrupted and asked to see a copy of their catalog. Lucy handed me one from a stack near her desk. Many hundreds of types of tubes were listed, including everything from the '01A to the most modern American and European types. Rare collector's tubes also were listed, including varieties by DeForest, Moorehead, RCA, and Western Electric (listings of their current rare tube stock are available upon request). All sorts of components, supplies, and books relating to radio repair and restoration filled the catalog.

I was intrigued by the whole concept of a business formed to sell tubes and parts for products of another era. After all, had not numerous electronic supply houses faded from the scene with the decline in the production of tube sets? Why then did this new business seem to be thriving?

It is a goal of the Fathauers to stock everything listed in their catalog (hence, the concern over the late delivery of the bus wire). Fast service has earned them repeat business not only from collectors, but from radio and television servicemen who need to get tubes and parts from old sets quickly, and who account for a large share of sales. So the business thrives primarily on mail-order volume for old and new tubes, with a secondary income

Horn speakers from the '20s, and an early regenerative set, probably one or two tubes.

coming from the sales of materials for repair and restoration. There is now enough demand from across the country (and it seems to be increasing) to support a specialty vendor like Antique Electronic Supply.

I asked George Jr. how the shop got its start.

"In around 1983," he related, "I was doing work in stereo repair as well as some antique restoration. I needed a tube for a 1927 Atwater Kent and had difficulty locating one. In searching for this tube, I found a man in Phoenix who wanted to sell his inventory of about 40,000 old and new tubes." George's entrepreneurial spirit told him that finding this cache of

These shelves hold Rider's *service manuals for sets from the '20s through the '50s, and Gernsback's* Official Radio Service Manuals.

The shelves hold sets from the '20s through the '50s.

fire bottles could mean much more than merely fulfilling his search for one tube; it could be the seed stock he needed to begin his own business. Very shortly he found himself the proud owner of a large vacuum packaged in 40,000 glass and metal shells.

George Sr. had recently retired from his career as an electronic engineer (he is the inventor of the scanning system widely used in Bearcat scanning receivers, and he designed the first television camera to travel above the stratosphere in America's fledging space program during the '50s). He agreed to join his son in founding a business to repair and sell antique radios, with special emphasis on selling tubes and other supplies for them. Thus, the Antique Radio and Tube Company was formed.

The Fathauers needed to build an inventory for their shop, so they began to search for sources of supply. They attended swap meets and joined a number of antique radio collector clubs. A great deal of time was spent in calling individuals, collectors, surplus houses, and shops going out of business- anyone with old tubes or parts. Now they are often on the receiving end of calls from all kinds of folks peddling electronic goodies. Nevertheless, the search for antique and vintage items represents an ongoing effort that consumes much time.

Despite the appeal of antique radios, the Fathauers have not found it especially profitable to repair and sell them. Indeed at least half of their business comes from tube sales, and not just the antique variety, either. Tubes of all kinds are becoming increasingly hard to find, and this segment of the business is expanding. Also in demand are parts and supplies needed by collectors in the repair and restoration of old sets.

Besides handling a wide range of replacement electronic parts, the Fathauers offer materials for restoration of the appearance of the old sets, too. They had two patterns of old- style grille cloth especially made for use in restoring sets from the '20s and '30s. Reproductions of Philco and RCA emblem decals are available to replace those lost during cabinet refinishing. Cloth-braid-covered power cord and antenna wire, in a silky brown fabric, will preserve the classic look when replacement is needed. They even stock several colors of cloth-covered hookup wire for restoration of the chassis, and of course the tinned square bus bar which was the cause of concern earlier.

Need a special knob for the old set? The Fathauers will search their collection for a matching replacement. Other knobs, old looking in a sort of generic way, are available in brown or black phenolic. And don't forget the wrinkle paint for your metal cabinets and speakers!

Fahnestock clips, fish paper, coils, headphones and cords, mica capacitors, "B" batteries for your '40s portable, power and audio transformers? Yes, they have them, and stuff even more esoteric than that. Galena crystals, station selector dials for your '30s Philco—I could go on, but a postcard will bring you their catalog for yourself!

I mentioned before that the shop has moved to a new, larger quarters and has been renamed "Antique Electronic Supply." Although old sets haven't been the key to the success of the business, since most revenue comes from mail orders, the Fathauers are interested in certain collectible models. Early crystal sets and pre-tube era equipment is desired, and cathedral-top Philco, Atwater Kent, and RCA models are always in demand. Bread-board sets from the 'teens and '20s are sought as well as early sets by DeForest, Greebe, and anything in an especially unusual design or motif. They have some limited interest in round-dial Zenith models, but generally they would prefer to stick to pre-WWII items (even signs, catalogs, and other collectible paraphernalia). Also needed are tube boxes for storage and shipment of all kinds of tubes.

View of the showroom. Most sets are from the '20s and '30s. In the center can be seen an RCA Radiola console with loop antenna (mid-20s production).

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CIRCLE 52 ON READER SERVICE CARD

Electro-kit one-tube receiver, Howe crystal set (1925), and Jefferson tube rejuvenator.

If you've read this far, you might be considering the restoration of a classic radio yourself. You will probably need information on what is available, prices, service data, operating manuals, etc. I recommend doing two things to start: Order some of the collecting guides available from Antique Electronic Supply. *Vintage Radio 1887–1929* and *A Flick of the Switch 1930–1950*, both by Morgan E. McMahon, are good collecting guides. *Antique Radios—Restoration and Price Guide* by David and Betty Johnson not only gives information on basic radio theory, trouble-shooting, and restoration, but also has a list of magazines directed toward the radio collector. Those periodicals can help you with information on the old sets, identification of sources of supply, and even with listings of complete sets for sale for those not wishing to tackle a restoration themselves. That brings up my second recommendation: Join the Antique Wireless Association (Main St., Holcomb, NY 14469) or the Canadian Vintage Wireless Association (69 Rossburn Drive, Etobicoke, Ontario M9C 2P9, Canada). The AWA can assist you in locating other radio collectors' clubs in your area, and they issue a quarterly newsletter, the "Old Timer's Bulletin" (subscription to the bulletin also gets you membership in the AWA).

It was time to go. I paid for my *Radio News* and several collecting guides, thanked the Fathauers for their hospitality, and turned to leave. I paused a moment to take in the atmosphere of the shop one last time. George Sr. answered a ringing phone. "Grid voltage for an 'O1A? Should be around minus 3 or 4½ volts or so; depends on your B+. . ."

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CIRCLE 127 ON READER SERVICE CARD

CELEBRATE

the 75th anniversary of ARRL with a new Handbook!

1989 marks the 75th anniversary of the founding of the League. There's no better way of celebrating this momentous occasion, than with the new *1989 ARRL Handbook for the Radio Amateur*!

The 1200-page sixty-sixth edition contains over 2100 tables, figures and charts. The new *Handbook* is better than ever with revised information on phase noise measurement, direct frequency synthesis and spread spectrum communication techniques. The section on repeaters has been updated including a new CW identifier circuit. You'll find new spectrum analyzer and oscilloscope material, as well as several new projects in the test equipment chapter.

As always, we've added a host of new construction projects to this new edition. Just some of the new projects include: A 500-MHz frequency counter, 160 through 10 meter legal limit amplifier, simple CMOS keyer project, digital audio memory keyer and a L/Q meter for measuring coil inductance.

But that's not all. You'll find many other popular construction projects that can be built in a weekend such as power supplies and VHF/UHF preamps. For the more ambitious builder there are projects like the 1.8 MHz QSK transverter (there are VHF/UHF transverter projects too) and there are many amplifier designs to suit your needs from HF through microwaves.

The Handbook has always been famous as a reference for component data and you will find an entire chapter devoted to everything from transmitting tube and transistor specifications to aluminum tubing sizes. Satellite enthusiasts will find that the digital TR sequencer will add operating convenience to your station. Of course, you'll find the most up-to-date information on digital techniques, and the video communications chapter is packed with information not only on SSTV, ATV and FAX but Weather FAX as well. QRP enthusiasts will find the famous "Cubic incher" transmitter; not much bigger are the QRP SWR indicator and QRP Transmatch. There is also a VXO-controlled 6-watt CW transmitter for your favorite band between 80 and 15 meters. There are a number of useful station accesories that you can build like DTMF encoders and decoders, PIN-diode TR switch, digital PEP wattmeter and SWR calculator, Transmatches and dummy loads.

For $21, *The ARRL 1989 Handbook for the Radio Amateur*, remains an exceptional value for a hardcover technical publication. The price outside the US is $23. For postage and handling, add $2.00 (or $3.50 for insured mail or UPS — please specify)

Here is a description of what is covered in the Handbook:
The first 5 chapters serve as an introduction and cover: basics of Amateur Radio, electrical fundamentals, radio design technique and language, and solid state fundamentals. Vacuum tube principles as they pertain primariliy to high power amplifier design are also presented in these introductory chapters. There are 12 chapters devoted primarily to these radio principles: power supplies, audio and video, digital basics, modulation and demodulation RF transmitters, receivers, transceivers, repeaters, power amplifiers, transmission lines and antenna fundamentals. Another 4 chapters cover voice, digital, image and special modulation techniques. The RF spectrum, propagation and space communications are covered in 2 chapters. The construction and maintenance section has 12 chapters of useful projects ranging from power supplies and antennas through digital equipment. You'll find up-to-date component data that the Handbook is famous for. The final 5 chapters cover how to obtain your license, station design and operation, interference, monitoring and direction finding. An abbreviations list, huge index and etching patterns make up the balance of the book.

The American Radio Relay League, Inc., 225 Main St., Newington, CT 06111 USA

CIRCLE 114 ON READER SERVICE CARD

Sometimes the most memorable part of a DXpedition is the manner in which you get to that rare zone, as can be seen from VE1BHA/3's story.

Contesting From Zone 2

BY JOHN CONNER*, VE1BHA/3

As anyone who has spent any time chasing zones in *CQ*'s WAZ program can tell you, some zones are a lot harder to work than others. One of the rarer ones is Zone 2, which is made up of northern Quebec and Labrador. It is rare chiefly because it is thinly populated. The largest city in the zone is Sept Iles, Quebec, with a population of about 30,000 people. Most settlements in the area are considerably smaller, often numbering only a few hundred persons.

In the summer of 1985 Kent Chown, VE2LJ, was ordained as a minister in the United Church of Canada and received his first posting, to the village of Harrington Harbour. This is a community of about 400 situated on an island in the Gulf of St. Lawrence. It is about 300 miles east of Sept Iles in an area of Quebec known as the Lower North Shore. The significant point about this village for radio amateurs was that it was just far enough north to be in Zone 2.

Since Kent blamed me for getting him involved in contesting, it seemed only fitting to immediately suggest a visit for a multi-single effort. In view of the fact that Kent doesn't admit to owning a microphone, we agreed on the 1986 *CQ* WW DX CW Contest. A third operator, Steve, VE3SMA, was quickly recruited and we started making plans.

Kent put up a TA33 on a 30 foot tower, and with an amplifier from NCDXF he was soon busy handing out Zone 2 QSOs. We felt that we would want a little more than a TA33 for the contest, so a second tower and 4-element monobanders for 20 and 15 were shipped. We would bring a TS830S and a small tribander with us for use in the multiplier station.

We then turned our attention to how to get to Harrington. This turned out to be a bit complicated. The highway ends just outside of Sept Iles, so driving was impossible. The villages of the Lower North Shore are connected by boat and airplane. But the boat service would not be running in November due to the presence of ice in the Gulf. Therefore, we had no choice but to fly. The airline which serves the area is Quebecair, which uses a fleet of Convair CV580 turboprops for the job.

The itinerary is an interesting exercise in the geography of Quebec. After a short flight from Ottawa to Montreal, we would board a Quebecair flight to Sept Iles, where we would spend the night. The next day, another CV580 would head east from Sept Iles, with stops at Havre St. Pierre, Natashqaun and Chevery, which is the airport nearest to Harrington Island. From there, Quebecair provides helicopter service to the surrounding villages, as well as dropping off passengers for the island. To go to Harrington Harbour, you purchase a ticket for the next stop, Tete-a-la-Baleine, but get off before you get there!

1112-18 Deerfield Dr., Nepean, ONT K2G 4L1

VE2LJ, Kent, at the rig. (The bottle of ketchup is because at the time we were behind and trying to catch up . . . ha ha).

I made reservations in the summer of 1986. Not surprisingly, it was the first time that my travel agent had ever booked a flight to Tete-a-la-Baleine. We would leave Ottawa on Wednesday, November 26, and arrive in Harrington 24 hours later, on Thursday. That would leave Friday for antenna work.

Harrington Bound

On Wednesday VE1BHA and VE3SMA headed for the Ottawa airport. Since it was a bit tough for Kent to get to the local Radio Shack (about 300 miles away in Sept Iles), we carried some RG8, rotor cable, and assorted odds and ends for him. This was in addition to the TS830S, keyer, paddles, logs, antenna wire, and so on that we were bringing for the contest. We could easily have outfitted a small electronics store.

We also had a TH2 tribander packed in a bag normally used to carry skiis. This is a great way to carry antennas on airplanes. It provides an easy way to carry the antenna, and all the ticket agents just take it for skiis when you check it. Just don't let them pick it up.

We had been warned that Quebecair was strictly enforcing weight limits for baggage, and we were both carrying roughly twice our allowance. We decided to cross our fingers and hope for the best. Apparently this worked, because at no point in our trip did anyone say anything about our overweight baggage. Well, there was one agent who did seem to think that my "skiis" were a bit heavy. He picked up the bag, his eyes bulged, and he said "Oooh la la!" I just tried to look innocent.

We arrived in Sept Iles at 2230 that night and were soon settled into our hotel for a good night's sleep and our 1030 departure for Harrington.

Thursday morning dawned bright and clear, and we headed back to the airport. We staggered up to the counter with our bags, desperately trying to make it appear that we had nothing but air and feathers in them. We gave our tickets to the agents, who informed us that our flight had been cancelled due to bad weather to the east.

Now anyone who travels in eastern Canada in the winter soon gets used to this happening. Steve and I are both former VE1s, so we took

Steve, VE3SMA, looking for multipliers.

This is how you get to and from the island.

this bit of news philosophically. The agent said that the flight might go later in the day, so we sat down to wait.

Sept Iles is the transportation hub of the Lower North Shore, so there is a fair amount of traffic through the airport. During our wait we saw several types of light aircraft, a DC9, and a couple of DC3s. What we didn't see was a plane headed for Harrington Harbour.

At 1 p.m. the flight was scrubbed, so we collected our luggage and headed back into town. We were now a bit concerned. Tomorrow was Friday, the day of the contest. We had to be in Harrington tomorrow.

Friday morning arrived heavily overcast and with snow. Back to the airport we went, thinking that there was no way that we would be going anywhere. Naturally, we were soon on a flight headed for Harrington.

As the CV580 droned through the clouds, we came up with a theory. Our CV580 to Sept Iles had flown in bad weather, and this trip was also being made in bad weather. Perhaps they could only fly in this kind of weather, which we came to refer to affectionately as "murk."

Our first stop was Havre St Pierre. After a few passengers got on, the plane taxied out to the end of the runway and turned around to line up for takeoff. As it did so, we could see the runway out the window. I looked at Steve, he looked at me, and we both agreed that it looked awfully short. The pilot locked the brakes, revved the engines up to maximum, let the brakes off, and we churned up off the tarmac and back into the murk.

At 3 o'clock that afternoon we arrived at Chevery in cold, snowy weather. Since we had not made our flight the day before, we were wait-listed for Friday's helicopter flight. The pilot would make his regular run and then come back to take us out to the island.

The airport at Chevery is not a big building, with the ticket office, freight office, arrival and departure lounges, plus the air-traffic-control center all being in the same 15 by 30 foot room. We sat there trying to relax, but found it difficult because of the behavior of the airport manager. He kept looking out the window, watching it snow harder and harder and get darker (twilight is about 4 o'clock), and shaking his head and saying "Tsk! Tsk! Closing in fast." I had visions of spending the contest in the airport.

We had, of course, noticed the radio under the airport counter, so we heard the pilot when he radioed in and said, "Tell those guys to get their luggage ready and wait outside." Quicker than you could say 5902, we bundled our stuff out the door onto the tarmac. The chopper appeared out of the gloom and we loaded it up. (Should you ever be in a similar position, you might be interested to know that a ski bag full of antennas only just fits in the cabin of a Bell Long Ranger.) With Steve in one seat, myself in another, and the 830 in a third, we headed off. Somewhere in the gathering darkness out there was Harrington Island.

Although it might seem strange, this was the first time in two days that I really had a chance to relax, even with exciting newspaper headlines composing themselves in my head: "Helicopter Ditches in Gulf. Three Killed." The water looked very cold and uninviting.

After about 15 minutes Harrington emerged out of the dark. The helicopter swooped in and touched down on the pad. We piled out, tossed our bags onto the pad, fell on top of them, and the chopper leaped off into the swirling snow. We had arrived! I checked my watch. Three hours until contest time.

We later found out that our pilot, Bob, had flown in Vietnam. This may have had something to do with the fact that he made the flight at all. Thanks, Bob.

We held a quick council of war with Kent to decide what had to be done in the way of antenna work. We decided to put up the second tower and string a 40 meter loop between the two towers. Despite the dark, the wind, and the −10°C weather, the work was finished by 0010Z. Sadly, the two monobanders and the second tribander were never to be unpacked.

On The Air

The first 24 hours of the contest went well, with about 1200 QSOs in the log. Then the aurora hit. During the next 24 hours, we eeked out another 600 QSOs. Well, if you go to the auroral zone for a contest, you shouldn't complain about aurora. Kent did say that the northern lights were very pretty, though.

We had no 10 meter propagation, and only 4 hours on 15 on Saturday. The result was a score of about 1.1M—a bit disappointing, but a new high for a Zone 2 CW effort.

Looking out Kent's front window toward Harrington Harbour with typical weather.

No - 45 - 46

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Pictures and maps can be *printed to screen in real time or from disk* if you have an IBM or Macintosh with the MFJ-1284 or MFJ-1287 Starter Pack.

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You can transmit slow scan pictures right off disk -- there's no need to set up lights and a camera for a casual contact.

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MFJ 3 KW Roller Inductor Tuner

. . . lets you get your SWR down to *absolute* minimum -- something a tapped inductor tuner just can't do . . .

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NEW

MFJ-986
$239.95

MFJ's innovative new Differential-T Tuner™ uses a differential capacitor that makes tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only *one* setting.

The new MFJ-986 is a rugged no-compromise 3 KW PEP Roller Inductor antenna tuner that covers 1.8-30 MHz continuously, including MARS and all the WARC bands. **The roller inductor lets you tune your SWR down to the absolute minimum** -- something a tapped inductor tuner just can't do.

A 3-digit turns counter plus a spinner knob gives you *precise* inductance control -- so you can quickly return to your favorite frequency.

You get a lighted Cross-Needle meter that not only gives you SWR, forward and reflected power at a glance -- but also gives you a **peak-reading** function! A new directional coupler gives you even more accurate readings over a wider frequency range.

You get a 6-position ceramic antenna switch that lets you select two coax lines and/or random wires (direct or through tuner), balanced line and external dummy load.

A new **current** balun for balanced lines minimizes feedline radiation that causes field pattern distortion, TVI and RF in your shack. Ceramic feedthru insulators for balanced lines withstand high voltages and temperatures.

New Antenna Tuner Technology

MFJ brings you **three innovations** in antenna tuner technology: a new *Differential-T*™ circuit simplifies tuning; a new *directional coupler* gives you more accurate SWR, forward and reflected power readings; and a new *current balun* reduces feedline radiation.

Differential-T Tuner™: A New Twist on a Proven Technology

By replacing the two variable capacitors with a single *differential capacitor* **you get a wide range T-network tuner with only *two* controls** -- the differential capacitor and a roller inductor.

That's how you get the new MFJ Differential-T Tuner™ that makes tuning easier than ever, gives you minimum SWR at only one setting and has a broadband response that ends constant re-tuning. You'll spend your time QSOing instead of fooling with your tuner.

The compact 10¾ x 4½ x 15 inch cabinet has plenty of room to mount the silver-plated roller inductor away from metal surfaces for maximum Q -- you get high efficiency and more power output.

The wide spaced air gap differential transmitting capacitor lets you run a full 3 KW PEP -- no worries about arcing.

A New Directional Coupler: Accurate SWR and Power Reading

MFJ's Cross-Needle SWR/Wattmeter gives you more accurate SWR and power readings over a wider frequency range with no frequency sensitive adjustments.

That's because MFJ's new directional coupler gives you up to an order of magnitude higher directivity and coupling factor than conventional circuits . . . *plus* it gives you a flat frequency response that requires **no** frequency compensation.

The cross-needle meter lets you read forward/reflected power in 2 ranges: 200/50 and 2000/500 watts. The meter lamp is front-panel switched and requires 12 volts.

A switch lets you select peak or average power readings.

A New Current Balun: Reduces Feedline Radiation

Nearly all commercially built tuners use a "voltage" balun. The "voltage" balun forces the *voltages* to be equal on the two antenna halves. It minimizes unbalanced currents *only* if the antenna is perfectly balanced --not the case with practical antennas.

The MFJ-986 uses a true **current balun** to force equal *currents* into the two antenna halves -- *even* if your antenna is not perfectly balanced -- so you get minimum unbalanced currents.

The *current* balun gives superior balance over the "voltage" balun.

Minimum unbalanced current reduces field pattern distortion -- which concentrates your power for a stronger signal -- *plus* it reduces TVI and RF in your shack caused by feedline radiation.

The MFJ-986 Differential-T Tuner™: Get *absolute minimum* SWR

Get the tuner that incorporates the latest innovations by the world's leader in antenna tuner technology.

See your dealer today for the new MFJ-986 Differential-T™ 3 KW Roller Inductor Tuner. Include $10 shipping/handling if ordering direct.

WHY CHOOSE AN MFJ TUNER?

Hard-earned Reputation: There's just no shortcut. *MFJ is a name you can trust* -- more hams trust MFJ tuners throughout the world than all other tuners combined.

Proven Reliability: *MFJ has made more tuners for more years than anyone else* -- with MFJ tuners you get a highly-developed product with proven reliability.

First-rate Performance: MFJ tuners have earned their reputation for being able to match just about anything -- *anywhere.*

One full year *unconditional* guarantee: That means we will repair or replace your tuner (at our option) *no matter what* for a full year.

Continuing Service: MFJ Customer Service Technicians are available to help you keep your MFJ tuner performing flawlessly -- no matter how long you have it -- just call 601-323-5869.

Your very best *value:* MFJ tuners give you the most for your money. Not only do you get a *proven* tuner at the lowest cost -- you also get a one year *unconditional* guarantee and *continuing* service. That's how MFJ became the world's leading tuner manufacturer -- by giving *you* your very best *value.*

Choose your MFJ tuner with confidence! You're getting proven performance and reliability from the most trusted name in antenna tuners. Don't settle for less.

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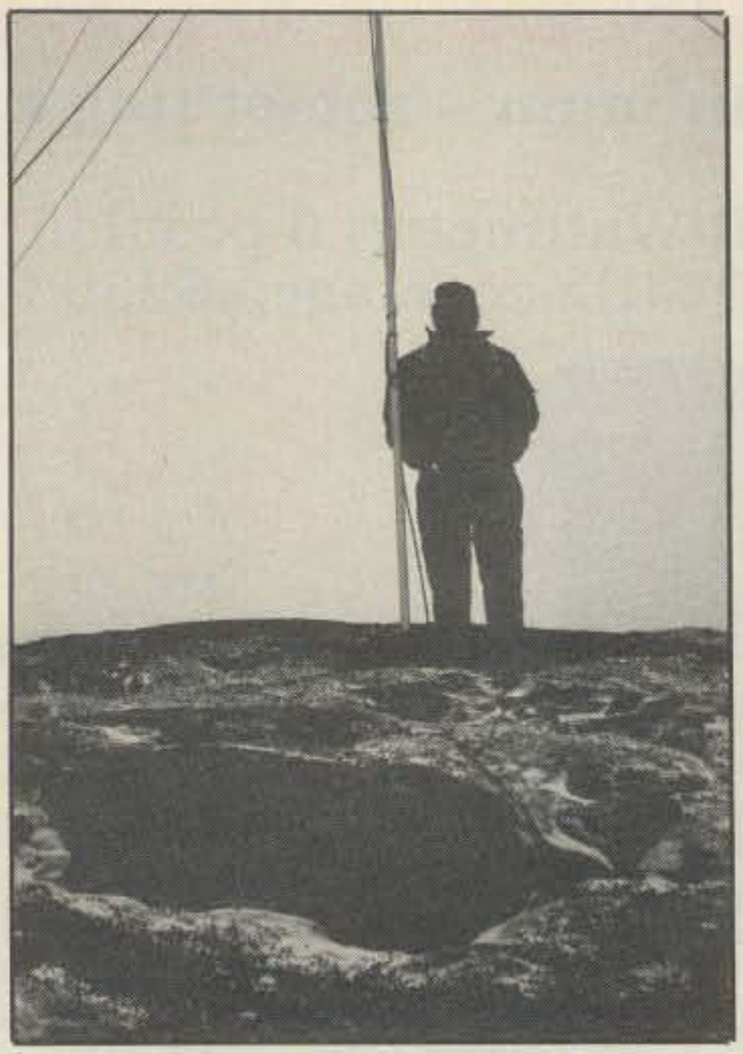


Kent standing beside the mast for the inverted vee. Note the overcast sky, typical weather for Harrington Harbour. Also note Kent's outfit—a survival suit designed to keep you alive if you end up in the Gulf of St. Lawrence in winter, when the water temperature is about 3°C. Survival time without a suit would be ½ hour. The suits are great for working on antennas in the winter and are the usual dress in winter in Harrington.

On Monday we dismantled our part of the station and returned to Chevery. As we were preparing to take off from Chevery, the stewardess asked everyone to please move forward, saying we could return to our seats when we were in the air. I figured it was due to a peculiarly heavy pair of skiis in the hold.

Tuesday morning saw us headed west for Montreal, where we were to change planes for Ottawa. While we were waiting, the pilot refused the aircraft, and we had to wait until another was made available. We finally arrived later Tuesday night back in Ottawa, only to find out that it was the only airport open for miles! A major snowstorm was blanketing the region. It seemed a fitting end to our trip, and we thought it very unlikely that we would do it again. But...

We went to Dayton in 1987, and on our way back we decided to give it another try that fall. I guess we got caught up in the atmosphere or something. I plead temporary insanity. I can't speak for Steve. Never make decisions on these sorts of things at Dayton.

1987

Having learned from the previous trip, we made our reservations for one day earlier, decided not to take the tribander, and asked Kent to see if he could arrange for some better propagation.

With our departure all set for Tuesday morning, I happened to pick up a new schedule for the airline on Sunday night. (In the interim, Quebecair had been bought and was now called Inter-Canadian.) In looking through their schedule, I noticed that I didn't seem to be able to find any of our flights listed. A few panicky calls at midnight Sunday confirmed that the airline had rearranged their flights, but somehow we had never been told about this! Worse, the airline was closed until 6 a.m., so there was little that could be done until then.

First thing Monday I was on the phone to Inter-Canadian. Yes, they said, the flights had been changed. But there was no problem, as all our flights had been rebooked. Well, they certainly had. We now had about a half-hour to change planes in Sept Iles and were spending the night in Quebec City. Our hotel rooms, of course, were in Sept Iles!

I spent my lunch hour Monday rebooking our flights and trying not to have a stroke. Monday afternoon I sat in my office muttering, "I hate ham radio!"

Off Again

Tuesday, November 24th, we were once again on a CV580 bound for Sept Iles, and Wednesday morning we were on another CV580 headed for Chevery! What a difference from the year before. Much to our surprise, CV580s can fly in nice weather. They just *prefer* abominal weather.

After a very pleasant flight we landed in Chevery, transferred to the helicopter, and flew over to the island. We arrived exactly on schedule.

We spent the next few days doing antenna work, and by noon Friday we had nothing to do. It was a strange feeling to spend Friday afternoon before a contest sitting around reading.

The station now had a TA33, 4 elements on 20 meters, a 40 meter dipole, a 40 meter inverted Vee that we had installed on the top of the hill behind Kent's house, a longwire, and a 160 meter inverted L. Incidentally, there are literally no trees on the island, which can make antenna work challenging, to say the least.

The Contest

Apparently, Kent had even managed to satisfy our request for better propagation, and we were able to come up with 2800 QSOs and just under 2.5 million points, the highest contest score ever from Zone 2. We knew we were having fun after working D44BC on six bands, all on skeds made at his request!

We even managed to eat pretty well this time around. One of Kent's parishoners contributed two homemade pizzas to the effort, but we did have to make due without any pepperoni on them. There wasn't any on the island.

We dismantled the station on Sunday night in preparation for an early departure on Monday. However, Murphy was about to make up for not getting us with the flight mix-up. He showed up in the form of a snowstorm. We spent Monday waiting to see if the helicopter was going to come to get us. It didn't. Having nothing better to do, we spent the day chasing DX and telling the people we worked that we were marooned, which was true enough. We were stuck on an island with no way off. My dictionary says that to be marooned is to be put ashore in a desolate place with no way off. Trust me; we were marooned!

On Tuesday, having learned from bitter experience not to trust the airline, we checked our reservations. Our flights for Monday had been projected forward to Tuesday. However, our Tuesday flights had not been changed. Once again, I rebooked our flights, and we waited to see if the helicopter would come.

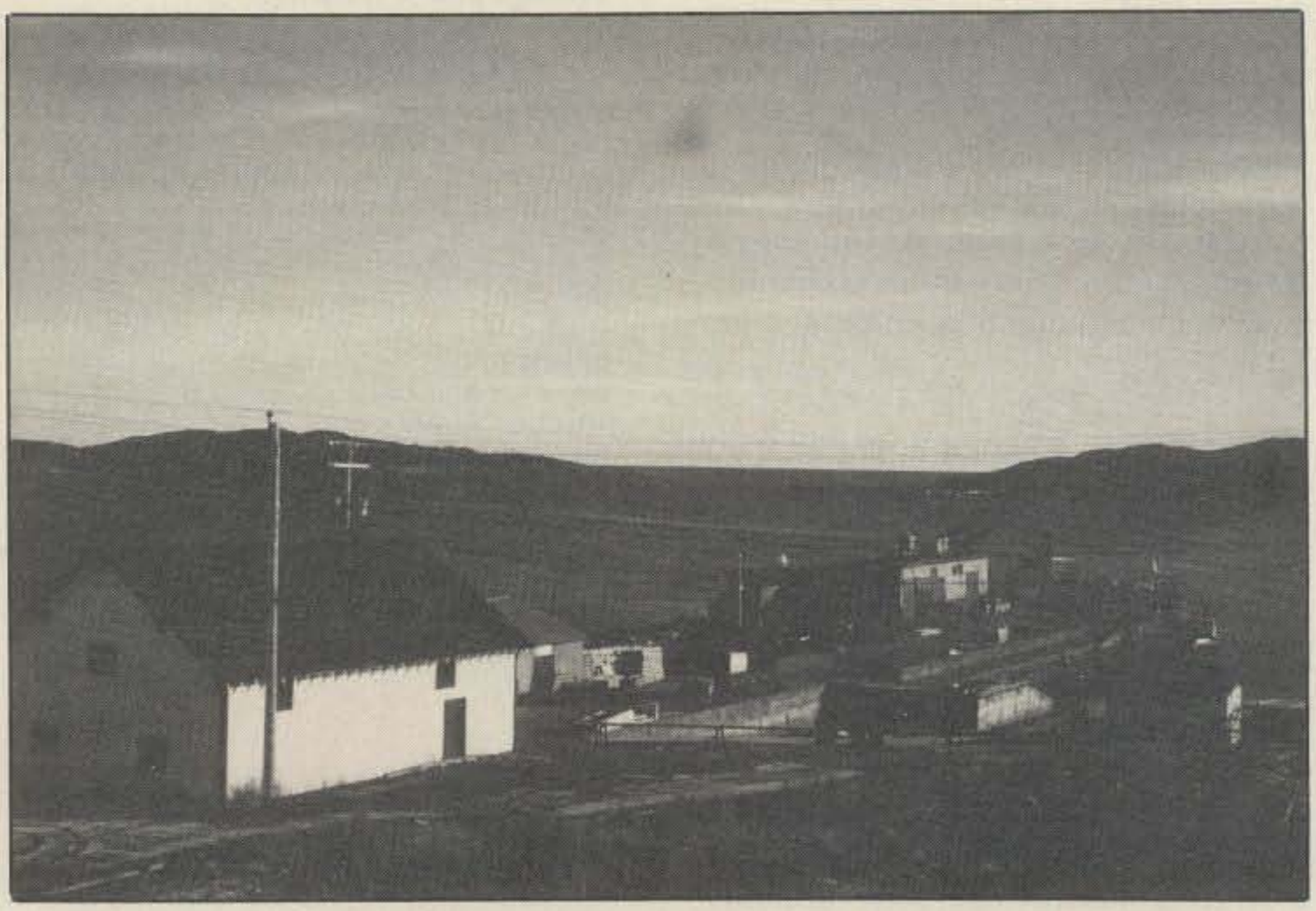
This time we were in luck, and the flight went on schedule. We were soon having lunch in the best restaurant in Chevery. It must be the best. It's the only restaurant in Chevery.

While we were sitting there after lunch, a fisherman who was waiting for the same flight that we were kept going to the window, looking out, shaking his head, and saying, "Tsk! Tsk!" I recognized this behavior from the year before. I didn't look out the window. I didn't want to know.

Ups and Downs

At 3 o'clock we walked back to the airport through a driving rainstorm to meet the incoming flight. The plane continues east from Chevery to Blanc Sablon, on the easternmost tip of Quebec, and then makes the trip in reverse back to Sept Iles. We were just there for entertainment.

Well, we got it. The pilot called in to say he was on final, and the airport manager gave him the weather—600 foot ceiling, one-quarter



Looking out Kent's front window over the harbour with better weather.

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A cross-needle SWR/Wattmeter gives you SWR, forward and reflected power -- all at a single glance. SWR is automatically computed with no controls to set. 30 and 300 watt scale on easy-to-read 2 color lighted meter (needs 12 V).

A handsome black brushed aluminum cabinet matches all the new rigs. Its compact size (10 x 3 x 7 inches) takes only a little room.

You can run full transceiver power output -- up to 300 watts RF output --and match coax, balanced lines or random wires from 1.8-30 MHz. Use it to tune out SWR on dipoles, vees, long wires, verticals, whips, beams and quads.

A 300 watt 50 ohm dummy load gives you quick tune ups and a versatile six position antenna switch lets you select 2 coax lines (direct or thru tuner), random wire or balanced line and dummy load.

A large efficient airwound Inductor -- 3 inches in diameter -- gives you plenty of matching range and less losses for more watts out. 100 volt tuning capacitors and heavy duty switches give you safe arc-free operation. A 4:1 balun is built-in to match balanced lines.

Order your convenience package now and enjoy.

MFJ 12/24 HOUR LCD CLOCKS

MFJ-108 $19.95 **MFJ-107 $9.95**

Huge 5/8 inch bold black LCD numerals make these 24 hour LCD clocks a must for your ham shack. Choose from a dual clock that displays UTC and local time or the single unit that displays 24 hour time.

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MFJ-962B VERSA TUNER III

MFJ-962B $229.95

Run up to 1.5KW PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

Lighted Cross-needle Meter reads SWR, forward and reflected power in one glance. Has 200 and 2000 watt ranges. 6 position antenna switch handles 2 coax lines, random wire and balanced lines. 4:1 balun. 250 pf, 6 kv variable capacitors. 12 position ceramic Inductor switch. Smaller size matches new rigs: 10¾ x 4½ x 14 7/8 inches. Flip stand for easy viewing. Requires 12V for light.

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MFJ's cross-needle SWR/Wattmeter gives you SWR, forward and reflected power -- all at a single glance! SWR is automatically computed -- no controls to adjust. Easy-to-use push buttons select three power ranges that give you QRP to full legal limit power readings. Reads 20/200/2000 W forward, 5/50/500 W reflected and 1:1 to 1:5 SWR on easy-to-read two color scale. Lighted meter needs 12 V. +10% full scale accuracy. 6½x3¼x4½ inches.

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MFJ-407B Deluxe Electronic Keyer sends iambic, automatic, semi-auto. or manual. Use squeeze, single lever or straight key. Plus/minus keying. 8-50 WPM. Speed, weight, tone, volume controls. On/Off. Tune. Semi-auto switches. Speaker. RF proof. 7x2x6 inches. Uses 9 V battery. 6-9 VDC or 110 VAC with AC adapter, MFJ-1305, $9.95.

ANTENNA CURRENT PROBE

MFJ-206 $79.95

MFJ Antenna Current Probe lets you monitor RF antenna currents -- no connections needed! Determine current distribution, RF radiation pattern and polarization of antennas, transmission lines, ground leads, building wiring, guy wires and enclosures.

- **Determine if ground** system is effective.
- **Pinpoint RF leakage** in shielded enclosures.
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- **Use** as tuned field strength meter.
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Sunset at VE2LJ. The mast is a support for a 40 meter inverted vee on top of a hill behind the shack. The object just to the right of the sun is a cairn which commemorates a visit to the island by Jacques Cartier.

Steve, VE3SMA, standing on the beach. Caribbean expeditioners get to stand on the beach wearing Hawaiian shirts and shorts. Zone 2 expeditioners get to wear parkas and boots. In the background is the Gulf of St. Lawrence. That's snow in the foreground.

mile visibility in heavy rain. "Aha," we thought, "CV580 weather!"

The manager was watching out the window, waiting to see the plane. Nothing. Still nothing. He shook his head and said, "He's gone down over." I thought about this rather alarming phrase, and decided it meant that the pilot had decided not to land at Chevery, but to keep going east. (All directions on the Lower North Shore are either up stream or down stream with reference to the St. Lawrence River. One, therefore, goes up to Sept Iles from Chevery and down to Blanc Sablon.)

Suddenly the plane materialized out of the murk and landed. He hadn't gone down after all. I don't know why, but something about the terminology in connection with airplanes bothers me.

In any case, it turned out to be a good thing that we had gone to the airport. After a few quick discussions, it was decided that all of Chevery's passengers would get on now, both those going down (to Blanc Sablon) and those going up (to Sept Iles). The plane would then not have to stop at Chevery on the westbound trip. After some confusion and milling about, we were all put aboard. Thus, we found ourselves in the curious position of being on our way to Sept Iles while going east from Chevery. It's like going from Pittsburgh to St. Louis by first going to New York.

This was CV580 weather with a vegeance. Drinks were served on the ground instead of in flight. The plane was slightly steadier on the ground.

Late that night we emerged from the gloom at Sept Iles, kissed the ground, collected our baggage, and headed back to our hotel. By now we knew our way around Sept Iles better than we have ever dreamed we would.

Wednesday was our flight from Sept Iles to Montreal. To our surprise, we were flying in a jet—a Fokker F28! This was luxury indeed. When we arrived in Montreal, though, and checked in for our flight to Ottawa, we were told that the flight was cancelled. "Good grief! Not *again*!" we wailed. The agent gave us a slightly puzzled look, and said that we had been projected forward onto the next flight. After a rather long wait in the airport, we had one last CV580 trip to Ottawa.

Conclusion

Between the two contests we gave out 4600 QSOs. Kent himself has made another 10K, so you have only yourself to blame if you haven't worked Zone 2 on CW.

Kent will be doing single operator in 1988, since he will probably be leaving Harrington Harbour in 1989, possibly for another rare zone. Maybe he would like some guest operators there.

In reading this over, I find that it is mostly about the trips and not very much about the actual contests. But then we spent more time going there and coming back than we did actually operating. In one sense, the actual operating was anticlimatic and doesn't stand out that much in my mind. The airports and the interiors of CV580s are indelibly etched in my mind, however. A trip like this begins to make you appreciate just how big a country Canada is.

The story of these two contest expeditions truly is in the expeditions, not in the contests.

In closing, I have to thank two people for making it all possible. First is Kent Chown, VE2LJ, for letting us come, disrupt his station, eat his food, and abuse his callsign. Second is Kent's hard working QSL manager, John VE3JDO, who didn't know what he was getting himself into when he volunteered for the job, but who has done yeoman service in processing Kent's cards quickly and efficiently.

Next year we are going somewhere in the Caribbean. It's warmer, cheaper, and a shorter trip.

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You can try 10 meter FM in almost any price range, and explained here are the options available in equipment to allow you to get on 10 FM.

Try 10 Meter FM!

BY W. PAUL WING*, K1WVX

More and more amateurs are trying 10 meter FM! One reason for this is that most of the new lowband transceivers include FM as standard equipment. Another reason is that the availability of 10 meter FM repeaters and mobile rigs has made 10 meter mobiling a lot of fun. Also, many citizen band rigs have been converted to 10 meters.

A number of overseas stations operate 10 meter FM. Recently I worked a station in the Canary Islands on simplex with only 10 watts output. (I forgot to turn on the amplifier.) I also worked a Djibouti station in East Africa through an American repeater.

For those who have not tried 10 meter FM, I will explain the various options that are available in frequencies, transceivers, low-power amplifiers, and antennas. You will see that you can try 10 meter FM in almost any price range. Also, don't overlook the fact that the sunspot cycle is on its way up!

Frequencies

The repeater inputs are at 29.52, 29.54, 29.55, 29.56, 29.57, and 29.58 MHz. The corresponding repeater outputs are 0.10 MHz higher at 29.62, 29.64, 29.65, 29.66, 29.67, and 29.68 MHz. The ARRL repeater directory lists most of the repeaters that are using these frequencies. Since a number of repeaters share the same frequency assignment, you can hear more than one set of repeater call letters when the skip is in certain directions.

The band plan specifies only one simplex frequency, which is 29.60 MHz. Since this is the calling frequency, you should move to another frequency after making contact. When changing frequency, remember to aviod the 29.3 to 29.5 MHz amateur radio satellite subband as well as the repeater input and output frequencies.

Some 10 meter FM repeaters are cross-linked with VHF and/or UHF repeaters. In this case you just use the 10 meter input frequency and your signal will be automatically retransmitted on the VHF or UHF repeater output frequency.

Experience has shown that the main problem with 10 meter FM is the lack of frequencies for both repeater and simplex operation. Since 10 meter FM is becoming more popular, it would appear that the satellite subband should be narrowed or shifted down in frequency so as to make room for a wider FM subband.

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Heil, Ltd., No. 2 Heil Drive, Marissa, IL 62257 (tel. 618-295-3000). CB transceiver board, parts kits, conversion parts, crystals, etc.

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John J. Meshna, Jr., Inc., 19 Allerton St., P.O. Box 8062, E. Lynn, MA 01904 (tel. 617-595-2275). CB transceiver boards, miscellaneous parts.

Communication Concepts, Inc., 121 Brown St., Dayton, OH 45402 (tel. 513-220-9677). Amplifier components, transistors, diodes, ferroxcube devices, etc.

Marlin P. Jones & Assoc., P.O. Box 12685, Lake Park, FL 33403-0685 (tel. 305-848-8236). Low-pass filter, amplifier heat sinks, switches, etc.

R.F. Parts, 1320 Grand Avenue, San Marcos, CA 92069 (tel. 619-744-0728). Power transistors.

Motorola, Inc., Literature Dist. Center, Mail Drop BB-100, P.O. Box 20924, Phoenix, AZ 85036. Data sheets and Engineering Bulletins.

Radiokit, P.O. Box 973, Pelham, NH 03076 (tel. 603-635-2235). Capacitors, enclosures, etc.

DC Electronics, P.O. Box 3203, Scottsdale, AZ 85257. Transistors, diodes, circuit board, etching solution, etc.

Radio Shack. Enclosures, circuit board, etching solution, miscellaneous parts.

Table I– Components suppliers.

Transceivers

Most of the major amateur radio manufacturers now include FM modulation on their low-band transceivers. Mobile brackets are available for most of the models that operate on 13 volts. Several companies are advertising new 10 meter mobile type transceivers that are very compact. There are some older 10 meter FM transceivers appearing on the second-hand market. Most of the solid-state ones that are second hand have 10 watts output.

Many excellent magazine articles have been written about converting CB transceiver printed circuit boards to 10 meter FM. The most popular conversions are those using Cybernet board numbers 33AOX, 36AOX, 39AOX, and Hy-Gain board number 75A080 (see bibliography entry number one at the end of this article). Some of these boards are still available on the surplus market for about $7.00 each. Some of the best magazine articles about converting these boards are listed in the bibliography. At least two companies sell kits which consist of a board, some other items needed to make the conversion, and the conversion directions. Suppliers of boards and kits are included in Table I. Since you would still have to add a cabinet, speaker, microphone, and many miscellaneous parts, the job is easier if you start by converting a complete CB transceiver that has one of the board numbers listed above. Some (but not all) of the transceivers made by Hy-Gain, Kraco, Midland, Pearce-Simpson (Tiger 40A), and Lafayette used these boards. Usually the board numbers can be checked by just removing the top cover. The majority of the converted transceivers sound very good and do not cause television interference.

Amplifiers

Although the 10 watt transceivers and converted CB rigs can work skip under ideal conditions, it is much easier to work

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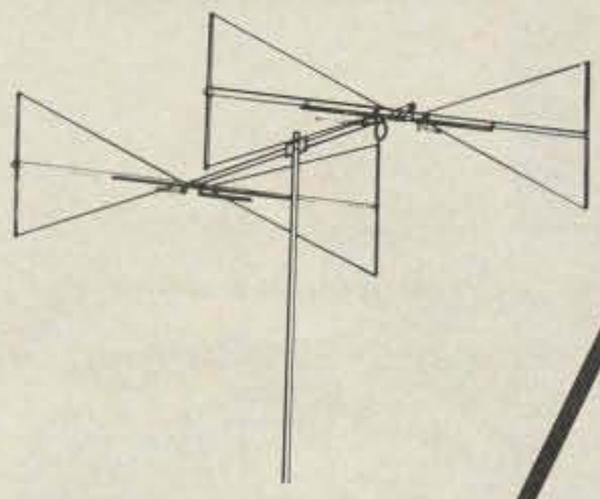

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The 10 meter amplifier is located to the right of the Azden transceiver. The low-pass filter can be seen near the back of the transceiver.

skip if you use higher power. The FCC ban on the manufacture of CB and 10 meter amplifiers is still in effect. This ban was instituted to prevent CB operators from obtaining amplifiers to use illegally. Fortunately, stable and effective amplifiers are easy to construct, and it is legal for amateurs to build and use them on 10 meters.

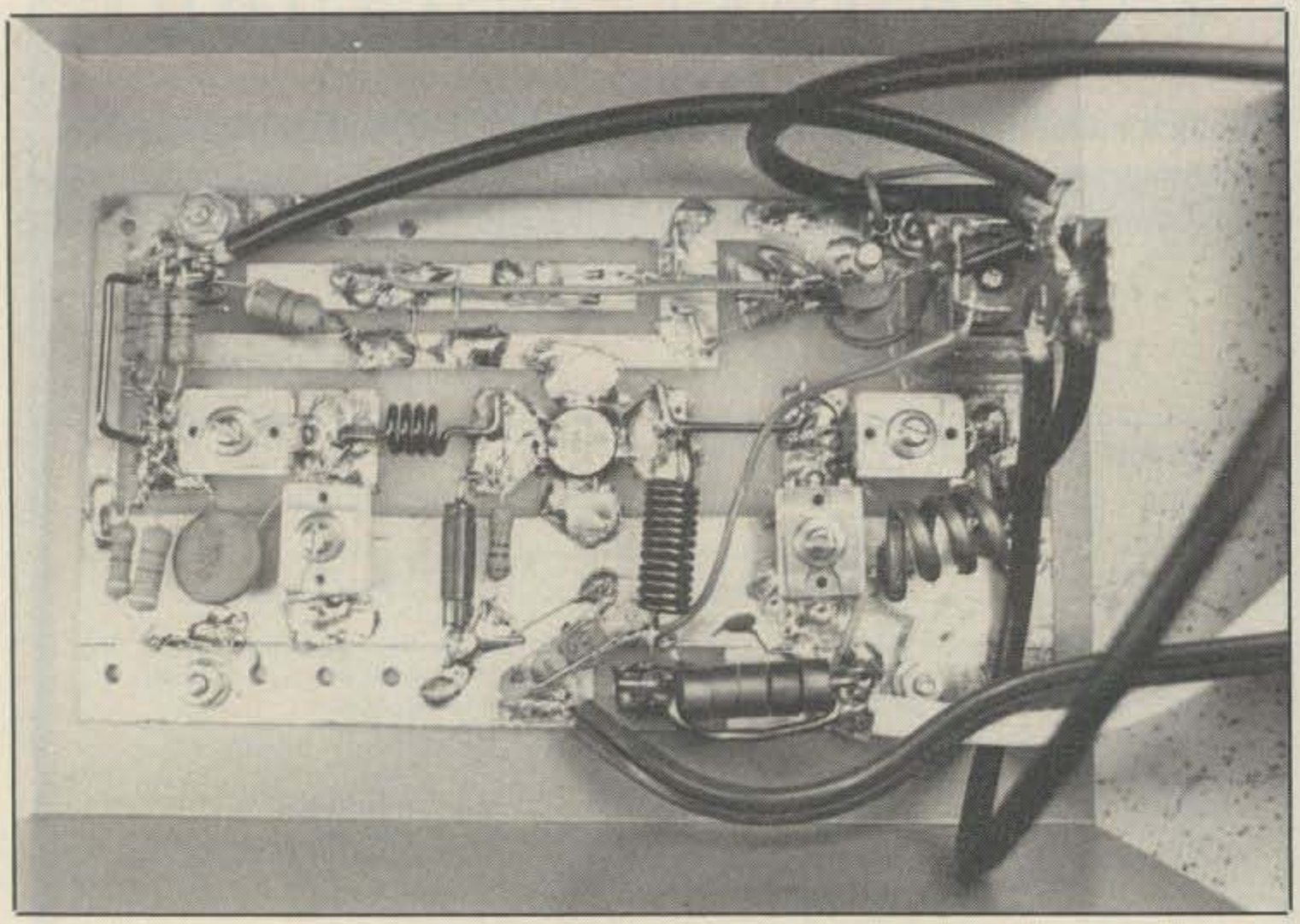
Motorola manufactures a number of power transistors that are suitable for 10 meter amplifiers, and they only cost about $15 each. The most appropriate ones are shown in Table II. Although each of these transistors costs about the same amount, the cost of the 13 volt DC supply to power the amplifier goes up with increasing size. This is the reason why Table II also shows the approximate DC current that is required for each transistor. I used one Motorola MRF454 transistor in my amplifier, and I share the DC power supply with my 2 meter amplifier. The 10 meter amplifier is shown to the right of the Azden 10 watt transceiver in the photo. The shared DC power supply is located remotely. The small DC power supply in the photo is used to power the Azden transceiver separately. The interior of the amplifier is shown in another photo. The amplifier enclosure is larger than required so that there is room to mount a low-pass filter inside.

Motorola Part Number	Rated Power (watts)	Approximate Current Required at 12.5 VDC (Amps)
MRF 450	50	9
MRF 453	60	10.7
MRF 454	80	14.2

Table II– Amplifier power transistors.

The Motorola MRF454 transistor needs only 3.5 watts of drive power to deliver its full output of 80 watts. The Motorola data sheet for this transistor includes a schematic and parts list for a 10 meter amplifier that uses one of these transistors. This "test circuit schematic" is not intended to be a complete construction document so it does not include a carrier operated relay (COR) circuit. The two-transistor amplifier shown in Motorola Engineering Bulletin No. EB63 includes a COR circuit designed for an RF input of 1 to 5 watts. This range is just right for the converted CB transceivers. You can use this COR circuit with the single transistor amplifiers.

I used an amplifier design that was slightly different from the one in the MRF454 bulletin and I had difficulty getting full power output. Other amateurs who have followed the bulletin have not had this difficulty. Table I includes suppliers of most of the amplifier parts that are not available at Radio Shack.



The amplifier has a single Motorola MRF 454A transistor located near the center of the printed circuit board. The relay is mounted at the upper right-hand corner of the board.

Low-Pass Filter

Solid-state amplifiers are often rich in harmonics. It is therefore good practice to add a low-pass filter right after the amplifier so as to prevent television interference. A compact four-section low-pass filter which is rated at 100 watts is available on the surplus market at a low price. This filter can be seen near the back of the Azden transceiver in the first photo. The filter enclosure does not have a bottom cover. However, one can easily be made from scrap aluminum or aluminum flashing material. The supplier of this filter is also listed in Table I.

Antennas

Vertical polarization is standard for 10 meter FM. Vertically polarized beams as well as ground-plane antennas are used. Some of these antennas have been converted from citizen-band antennas by reducing the length of the elements. Five-eighth-wave citizen-band antennas have substantial gain and have also been con-

verted. The Cushcraft 10 meter Ringo Ranger antenna has substantial gain and does not require radials because it is one-half wavelength long.

Many amateurs are using their horizontally polarized beams with good results. The beams have high gain, and many operators believe that the original polarization is lost when the signal skips off the ionosphere. My tribander has a standing-wave ratio above 3:1 at the FM frequencies, so I use a separate antenna. An antenna tuner could also be used to provide an acceptable match.

As a temporary measure I mounted my Hustler 10 meter mobile antenna inside my attic and equipped it with four radials made of lamp-cord wire. The tuning whip had to be trimmed slightly in order to resonate at 29.6 MHz. It was mounted on a homemade base which used the Radio Shack 3/8″-24 stud mounting hardware (catalog No. 21-950). A considerable number of skip contacts were made with this modest antenna.

At 10 meters RG8 coaxial cable is preferred over smaller diameter cables such as RG8-X or RG58 because it has lower loss. This is especially true for long runs of cable. One third of the transmitter power is lost when using 100 feet of the best RG58/U foam cable. The loss is proportional to length. For example, one sixth of the power is lost if 50 feet of RG58/U foam cable is used. The RG8-X cable is the second choice because its loss is also less than RG58 cable. This cable is only slightly larger in diameter than RG58.

Mobile Operation

If you like mobile operation, you will find that 10 meter FM is a lot of fun. The band skips very well when it is open, and you can take advantage of this to make long-distance mobile contacts. The use of amplifiers, and the option to use repeaters, makes long-distance contacts more likely. Remember, however, that safe driving is more important than long-distance contacts.

Most amateurs are apprehensive about the theft of mobile equipment. In this case, the option to use a converted citizens-band transceiver, or transceiver board, with a moderately priced home-made amplifier significantly reduces the cost and therefore the concern about theft.

Safety Precautions

Be cautious when you are stationary and operating your mobile rig on any band! Bumper-mounted antennas are so low that young children can easily touch them, and even most adults don't realize that they can get an RF burn by touching a mobile antenna. Don't forget that you can get an RF burn when your amplifier is being operated out of its enclosure for adjustment.

Also, if you assemble a transceiver from a printed circuit board or build an amplifier, don't forget to fuse the DC input.

Final Comments

Besides being a very interesting band to use, the options to convert citizen-band equipment and to build amplifiers provides the opportunity to construct equipment that performs very well at low cost. There are not many opportunities to do this today without running into parts procurement problems or taking on elaborate, time-consuming projects.

There may be other suppliers who still have Cybernet boards or other components. It was not my intention to leave out any suppliers. However, I only listed the ones I know have had parts within the last 12 months.

I would like to thank Rob, WB1AEX, and Darryl, WA1WYN, for helping me to get started on 10 meter FM. If you have any questions, please include a stamped, self-addressed envelope.

Don't put off trying 10 meter FM any longer! Remember that the sunspot cycle is on the way up!

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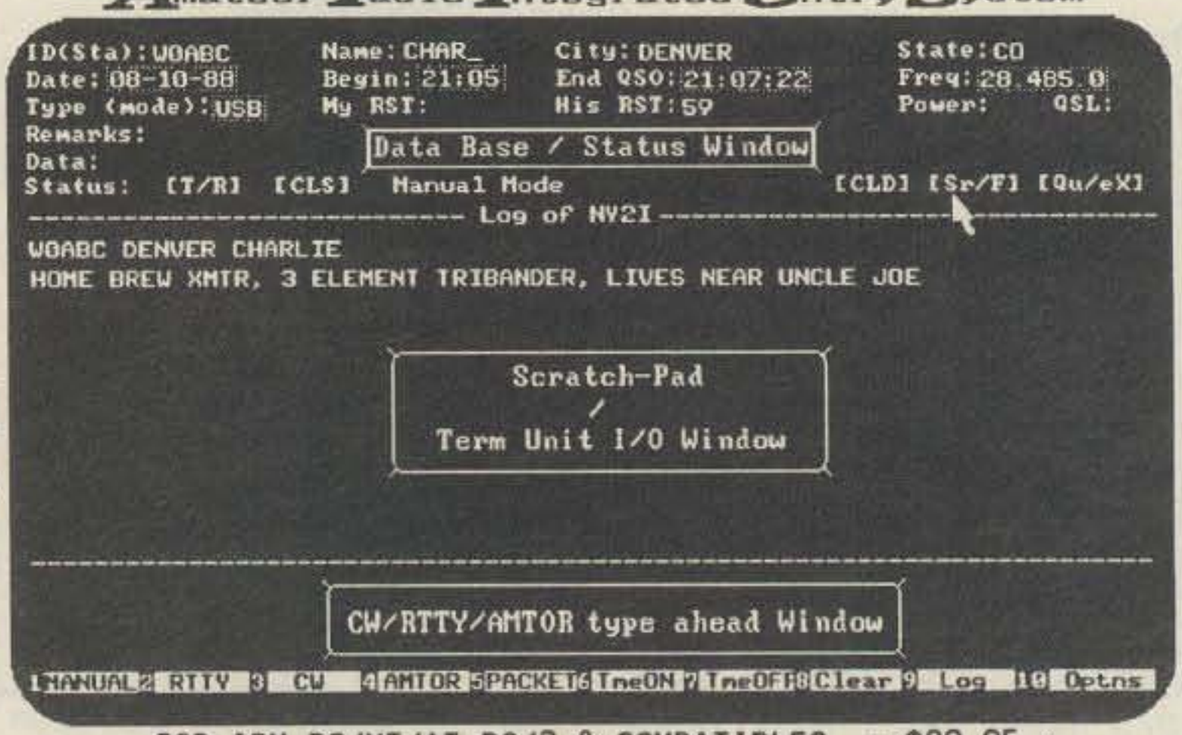

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10/88

CIRCLE 139 ON READER SERVICE CARD

CQ World-Wide DX Contest All-Time Phone Records

BY FREDERICK CAPOSSELA, K6SSS

In the records listed below, boldface listings denote world records. Number groups after calls are: year of operation, total score, contacts, zones, and countries. All-band and Multi-Operator records include a band-by- band breakdown of the world leader in each category.

Single Operator/Single Band
WORLD RECORD HOLDERS

1.8	UG7GWO('87)	255,852	1,327	12	57
3.5	P4ØR('87) (Opr. K4UEE)	552,786	1,628	23	91
7.0	EA8RCT('87) (Opr. OH2MM)	859,362	1,959	32	115
14	VP2KAA('81)	2,011,185	4,186	37	150
21	PY5EG('87)	2,468,529	4,421	38	151
28	YV2AMM('82)	1,839,004	3,700	37	130

AFRICA

1.8	EA8AK('82)	34,220	201	12	46
3.5	CT3BZ('79)	235,113	772	22	87
7.0	EA8RCT('87) (Opr. OH2MM)	859,362	1,959	32	115
14	CR6WW('74)	1,058,446	2,152	35	132
21	EL2AV('81)	1,404,936	3,087	35	117
28	OH2MM/CT3('79)	1,827,150	4,068	37	113

ASIA

1.8	UG7GWO('87)	255,852	1,327	12	57
3.5	UW9AF('83)	222,192	554	19	53
7.0	JA8IXM('86)	316,382	794	37	109
14	RFØFWW('87) (Opr. UF6FFF)	1,447,128	2,894	40	147
21	4S7AAG('81) (Opr. OH2BCP)	918,925	2,897	38	137
28	4XØU('80) (Opr. 4X4UH)	1,187,200	2,555	37	123

EUROPE

1.8	LZ2CJ('84)	107,818	1,319	13	61
3.5	UA2FGA('87)	196,992	1,271	28	86
7.0	IO3MAU('87)	430,332	1,657	34	107
14	LZ1KGB('87) (Opr. LZ1JY)	1,388,628	3,168	39	165
21	LZ2KTS('83) (Opr. LZ2CC)	1,368,897	2,821	39	152
28	9H1EL('81)	1,355,760	3,662	36	132

NORTH AMERICA

1.8	VE3BMV('86)	52,240	662	14	26
3.5	VE3BMV('85)	383,040	1,629	25	89
7.0	VP2ET('85) (Opr. K5RX)	850,795	2,295	31	124
14	VP2KAA('81)	2,011,185	4,186	37	150
21	V22A('86) (Opr. WB7RFA)	1,789,470	4,075	37	140
28	KV4FZ('79)	1,482,525	4,079	39	126

OCEANIA

1.8	KH6CC('85)	45,984	484	13	19
3.5	T32AF('85)	222,768	1,064	23	49
7.0	T32AF('84) (Opr. KH6UR)	677,844	2,045	34	80
14	ZM1BIL('83)	1,334,232	2,635	38	136
21	AHØAB('82) (Opr. JA3DOC)	1,923,840	4,509	36	108
28	AHØB'(82) (Opr. JA2VUP)	1,788,430	4,173	36	109

SOUTH AMERICA

1.8	YV2IF('84)	18,291	172	14	25
3.5	P4ØR('87) (Opr. K4UEE)	552,786	1,628	23	91
7.0	9Y4VU('84)	700,488	1,718	28	110
14	P4ØSS('87) (Opr. K2SS)	1,792,056	3,570	35	133
21	PY5EG('87)	2,468,529	4,421	38	151
28	YV2AMM('82)	1,839,004	3,700	37	130

Single Operator/All Band

AF	EA8AK('81)	9,974,811	5,506	152	457
AS	EX6F('84)	6,362,000	4,648	113	387
EU	YU3EY('82)	4,913,574	3,170	136	455
NA	HI8PGG('81) (Opr. N1GL)	9,009,721	7,190	131	392
O	KH6XX('81)	5,713,434	4,912	131	262
SA	9Y4VT('82) (Opr. N6AA)	11,954,696	7,082	146	422
QRP	PJ2FR('87) (Opr. K7SS)	3,171,166	3,212	100	234

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	39	7	9
9Y4VT	3.5	404	17	57
(1982)	7.0	748	25	78
11,954,696	14.0	1,620	32	89
	21.0	1,476	34	96
	28.0	2,795	31	93
	Total	7,082	146	422

Multi-Operator/Single Xmtr.

AF	ED9CM('83)	10,157,160	5,148	152	511
AS	RG6G('82)	12,276,352	6,012	156	558
EU	I4RYC('80)	9,918,368	5,997	139	453
NA	NP4A('82)	14,953,818	8,772	174	585
O	KH6XX('85)	7,632,357	5,657	149	308
SA	9Y4W('82)	16,775,034	8,097	158	540

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	124	8	25
9Y4W	3.5	296	17	59
(1982)	7.0	594	27	86
16,775,034	14.0	1,953	35	127
	21.0	2,104	35	121
	28.0	3,026	36	122
	Total	8,097	158	540

Multi-Operator/Multi-Xmtr.

AF	EA8CR('77)	21,351,898	10,290	153	544
AS	EW6V('82)	18,746,136	10,100	142	544
EU	OHØW('82)	19,030,501	10,773	188	729
NA	VP2KC('79)	37,770,012	17,767	175	677
O	KH6XX('79)	21,990,252	10,989	184	494
SA	P41C('81)	41,957,244	17,718	173	625

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	261	9	21
P41C	3.5	861	22	69
(1981)	7.0	1,752	30	98
41,957,244	14.0	4,837	38	156
	21.0	5,790	39	143
	28.0	4,813	35	138
	Total	17,718	173	625

CQ World-Wide DX Contest All-Time C.W. Records

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	YV3AGT('85)	147,588	591	21	63
3.5	P4ØR('86) (Opr. K4UEE)	576,725	1,682	25	90
7.0	VP2KAA('83) (Opr. N4PN)	837,366	2,461	30	104
14	P4ØN('86) (Opr. N4PN)	1,477,905	3,138	37	122
21	LO8WW('87) (Opr. LU8DQ)	1,391,355	3,198	37	110
28	LU8DQ('79)	1,033,399	2,775	34	93

AFRICA

1.8	EA8AK('82)	75,768	385	15	51
3.5	EA8RCT('86)	441,350	1,524	22	75
7.0	EA7TL/9('83)	354,308	1,175	21	80
14	EA8ID('87) (Opr. DK3GI)	1,212,384	2,336	39	134
21	5H3BH('87) (Opr. SMØAJU)	1,098,810	2,542	38	107
28	FRØMM('79)	978,012	2,590	36	90

ASIA

1.8	UP2NK/UF('87)	113,718	613	12	54
3.5	ZC4DX('87) (Opr. 4Z4DX)	430,560	1,318	29	88
7.0	UP3BA/UF('86)	696,134	1,875	32	92
14	4XØU('82)	735,504			
21	4Z4NUT('80)	519,831	1,500	34	83
28	4X4UH('80)	554,645	1,772	32	83

EUROPE

1.8	HB9AMO('87)	97,064	762	19	69
3.5	UA2FGA('87)	403,686	1,918	30	93
7.0	YU3ZV('87)	709,104	2,012	38	120
14	DK3GI('86)	822,024	2,006	39	129
21	YU3ZV('81)	732,096	1,957	37	107
28	DK3GI('79)	592,848	1,584	31	101

NORTH AMERICA

1.8	K5UR('85)	47,005	219	25	60
3.5	VP2KAC('83) (Opr. N4RJ)	332,880	1,302	28	86
7.0	VP2KAA('83) (Opr. N4PN)	837,366	2,461	30	104
14	VP2KAA('80) (Opr. N4PN)	1,244,782	3,111	37	117
21	VP2KAC('80) (Opr. N4RJ)	1,075,407	2,955	36	105
28	KV4FZ('79)	653,072	2,384	32	87

OCEANIA

1.8	KH6CC('85)	23,746	257	15	16
3.5	VR3AH('76)	178,560	956	24	40
7.0	KH6XX('84)	427,230	1,424	33	68
14	KH6MD('85)	610,722	1,640	37	89
21	KH6XX('78) (Opr. K7SS)	816,102	2,311	38	81
28	KG6DX('80)	801,876	2,367	35	79

SOUTH AMERICA

1.8	YV3AGT('85)	147,588	591	21	63
3.5	P4ØR('86) (Opr. K4UEE)	576,725	1,682	25	90
7.0	YW1O('87) (Opr. YV1DIG)	758,898	2,016	32	94
14	P4ØN('86) (Opr. N4PN)	1,477,905	3,138	37	122
21	LO8WW('87) (Opr. LU8DQ)	1,391,355	3,198	37	110
28	LU8DQ('79)	1,033,399	2,775	34	93

Single Operator/All Band

AF	9Q5NW('87) (Opr. N6AA)	7,586,300	4,768	150	385
AS	5B4TI('87) (Opr. N6ZZ)	5,816,907	3,949	126	387
EU	I4IND('87)	4,188,034	3,204	147	395
NA	NP4A('87) (Opr. N2NT)	7,247,448	5,382	140	394
O	N6BT/AHØ('81)	4,241,746	4,083	121	228
SA	FY5YE('87) (Opr. OH2MM)	8,201,163	5,307	142	381
QRP	UP2BIM('82)	899,932	1,351	83	279

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	122	12	27
FY5YE	3.5	297	16	41
(1987)	7.0	805	24	63
8,201,163	14.0	1,305	35	89
	21.0	1,807	30	83
	28.0	971	25	78
	Total	5,307	142	381

Multi-Operator/Single Xmtr.

AF	EA8AGD('87)	9,816,540	5,763	144	426
AS	RG6G('82)	10,394,658	5,355	166	511
EU	YU3EY('81)	7,674,190	4,051	150	345
NA	NP4A('82)	11,648,565	6,881	168	515
O	KD7P/KH2('84)	4,487,665	3,375	159	296
SA	P41E('81)	8,059,296	5,055	148	388

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	172	15	35
NP4A	3.5	589	23	73
(1982)	7.0	1,342	28	92
11,648,565	14.0	1,270	36	108
	21.0	1,547	34	106
	28.0	1,[illegible]61	32	101
	Total	6,881	168	515

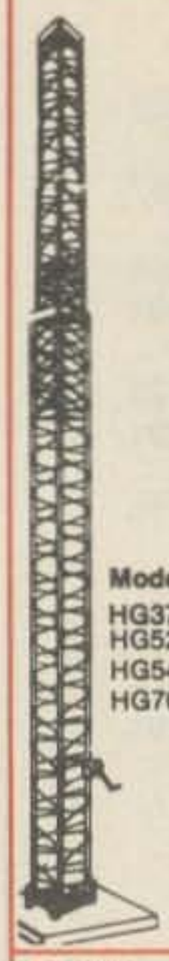
Multi-Operator/Multi-Xmtr.

AF	EA9EA('87)	23,425,035	11,131	172	533
AS	EW6V('82)	14,702,688	8,001	159	504
EU	OHØW('82)	14,371,840	9,515	184	618
NA	KP2A('87)	25,019,982	12,387	188	595
O	AHØC('83)	6,877,750	5,164	149	302
SA	P42E('82)	23,295,408	12,315	161	475

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	711	23	65
KP2A	3.5	890	23	77
(1987)	7.0	2,502	34	115
25,019,982	14.0	3,422	39	129
	21.0	2,417	37	103
	28.0	2,445	32	106
	Total	12,387	188	595

ANTENNA/TOWER SALE!



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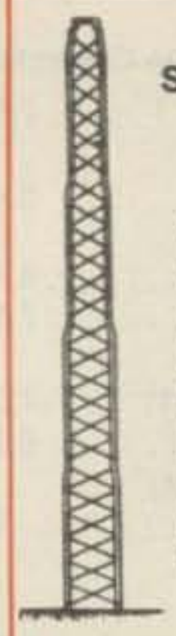
All Models Shipped Factory Direct—Freight Paid*!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$CALL
HG52SS	52 ft	9 sq ft	$CALL
HG54HD	54 ft	16 sq ft	$CALL
HG70HD	70 ft	16 sq ft	$CALL

Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



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Self Supporting Towers On SALE!

FREIGHT PREPAID

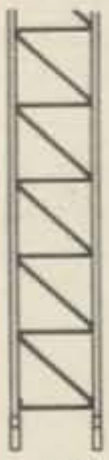
- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	228	$419
HBX48	48 ft	10 sq ft	303	$539
HBX56	56 ft	10 sq ft	385	$629
HDBX40	40 ft	18 sq ft	281	$519
HDBX48	48 ft	18 sq ft	363	$619

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

ROHN

Guyed Tower Packages



- World Famous Rohn Quality and Dependability
- Rugged high wind survival-provides safe installation
- Multi purpose towers satisfy a wide range of needs
- Complete packages include: guy hardware, turnbuckles, guy assemblies, w/torq bars, concrete base, rotor plate and top section per manufacturers specs.

Packages shown below are rated for wind zone "B" (86 mph wind). Zone "C" (100 mph wind) design prices slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

	Model 25G	Model 45G	Model 55G
50'	$669	$1369	$1689
60'	849	1549	1899
70'	919	1699	2069
80'	1099	1899	2299
90'	1179	2199	2489
100'	1269	2399	2689
110'	1499	2569	3129
120'	1579	2749	3349

US TOWER CORPORATION

These rugged crankup towers and masts now available from Texas Towers!

Check these features:
- All steel construction
- Hot dipped galvanized
- Totally self-supporting-
- No guys needed

Coax arms, Thrustbearings Masts, Motor drives, Remote controls, Hinged bases, Rotor bases, & Raising fixtures also in stock-

CALL FOR SALE PRICES!

Model	Min.Ht.	Max.Ht.	Ant.load*	Sale price
MA40 mast	21'	40'	10 sq ft	$629
MA550 mast	22'	50'	10 sq ft	999
TX438	22'	38'	18 sq ft	919
TX455	22'	55'	18 sq ft	1385
TX472	23'	72'	18 sq ft	2279
HDX555	22'	55'	30 sq ft	2079
HDX572	23'	72'	30 sq ft	3559

Note-US Towers Shipped Freight Collect From Visalia, CA Factory

***Note-towers rated at 50 mph to EIA specifications**

RG-213U

$.36/ft $349/1000 ft. Up to 600 ft via UPS

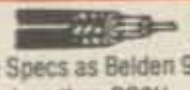
- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X

$.22/ft $209/1000 ft.

- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

9086



$.42/ft $409/1000 ft.

- Same Specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

HARDLINE/HELIAX®

Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket ..... $.79/ft.
½" LDF4-50 Andrew Heliax® ..... $1.99/ft.
⅞" LDF5-50 Andrew Heliax® ..... $4.99/ft.
select connectors below

Heliax® is a Registered Trademark of the Andrew Corp.

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE & HELIAX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$25	$25	$33	$33
⅞" Heliax®	$29	$29	$29	$29
⅞" Heliax®	$55	$55	$55	$55

COAX CONNECTORS

Amphenol Silver PL259 ..... $1.50
UG21B N Male $3.50
9086/9913 N Male Connector $4.95

ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga ..... $.10/ft.
¼ mile 18ga copper-clad steel wire $30
Dog bone end insulator ..... $.79 ea.

Van Gorden

1:1 Balun ..... $15 Center Insulator $8
Dipole Kits D80 $31.95/D40 $28.95
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All-band Dipole w/ladder line $29.95
G5RV all band antenna $49.95

ALPHA DELTA

DX-A 160-80-40 Sloper $49

CUSHCRAFT

A3 3-el Tribander $259
A4S 4-el Tribander Beam w/S.S. Hdwre $349
A743 & A744, 30/40 mtr KIT for the A3 & A4 ..... $ 89
R4 20-10 mtr Vertical $229
AP8 80-10 mtr Vertical $159
AV5 80-10 mtr Vertical $119
D40 40 mtr Dipole $159
40-2CD 2-el 40 mtr Beam $339
A50-5 5-el 6 mtr Beam ..... $ 98
215 WB NEW 15-el 2 mtr Beam ..... $ 89
230 WB NEW 30-el 2 mtr Beam $229
4218 XL 18-el 2 mtr Beam $129
3219 19-el 2 mtr Beam $109
424B 24-el 432 MHz Beam ..... $ 89
ARX2B 2 mtr Vertical ..... $ 45

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CALL FOR SPECIAL PRICES!

Discoverer 2-el 40-mtr Beam .....
Discoverer 3-el Conversion Kit .....
EXPLORER-14 SUPER-SPECIAL .....
QK710 30/40 mtr. Add-On-Kit .....
V2S 2-mtr Base Vertical .....
V4S 440MHz Base Vertical .....
TH5MK2S Broad Band 5-el Triband Beam .....
TH7DXS 7-el Triband Beam .....
TH3JRS 3-el Triband Beam .....
205BAS 5-el 20-mtr Beam .....
155BAS 5-el 15-mtr Beam .....
105BAS 5-el 10-mtr Beam .....
204BAS 4-el 20-mtr Beam .....
64BS 4-el 6-mtr Beam .....
12 AVQ 20-10 mtr vertical .....
14 AVQ 40-10 mtr vertical .....
18 AVT/WB 80-10mtr Vertical .....
18HTS 80-10 mtr Hy-Tower Vertical .....
23BS 3-el 2 mtr Beam .....
25BS 5-el 2 mtr Beam .....
28BS 8-el 2 mtr Beam .....
214BS 14-el 2-mtr Beam .....
2BDQ 80/40 mtr Trap Dipole .....
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BN86 80-10 mtr KW Balun W/Coax Seal .....

HUSTLER

6BTV 80-10 mtr Vert $149 5BTV 80-10 mtr Vert $129
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Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

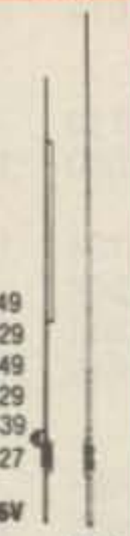
BUTTERNUT ELECTRONICS CO

HF6V 80-10m Vertical $129 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical $129 Delivered
- Full Legal Power
- Automatic Band Switching

Accessories:

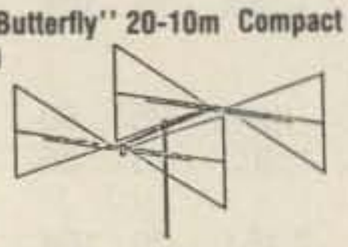
RMK II Roof Mtg. Kit $49
STR II Stub-Tuned Radials $29
TBR160 160m Coil Kit $49
30m Add-on Kit $29
20m Add-on Kit $39
17/12m Add-on Kit $27



HF6V HF2V

FREE UPS on ACCESSORIES when purchased w/antenna

HF5B "Butterfly" 20-10m Compact Beam $199.00



- Unique Design Reduces Size
- No Lossy Traps
- Turns w/TV Rotor
- Boom Length 6 Feet
- Element Length 12.5 Feet

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KT34A 4-el Broad Band Triband Beam $399.95
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Alliance HD73 (10.7 sq ft rating) $119.95
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Telex CD 45II (8.5 sq ft rating) ..... $Call
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10 FT. STACKED SECTIONS

20G ..... $49.50 45G $139.50
25G ..... $59.50 55G $179.50

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Model	Height	Ant. Load*	Price
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FK2558	58 ft.	13.3 sq. ft.	1199
FK2568	68 ft.	11.7 sq. ft.	1239
FK4544	44 ft.	34.8 sq. ft.	1489
FK4554	54 ft.	29.1 sq. ft.	1599
FK4564	64 ft.	28.4 sq. ft.	1699

25G Double Guy Kit ..... $279.
45G Double Guy Kit ..... $299.

*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies.

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3/16 CCM Cable Clamp (3/16" or 5/32" ..... $.45
1/4 CCM Cable Clamp (1/4" Cable) ..... $.55
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1/2 × 9EE (1/2" × 9" Eye to Eye Turnbuckle) $9.95
1/2 × 9EJ (1/2 × 9" Eye & Jaw Turnbuckle) $10.95
1/2 × 12EE (1/2"12" Eye & Eye Turnbuckle) $12.95
1/2 × 12EJ (1/2" × 12" Eye & Jaw Turnbuckle) $13.95
5/8 × 12EJ (5/8" × 12" Eye & Jaw Turnbuckle) $16.95
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Model	Cont. Amps	ICS Amps	Price
RS4A	3	4	$ 45
RS7A	5	7	55
RS12A	9	12	75
RS20A	16	20	95
RS20M	16	20	115
RS35A	25	35	145
RS35M	25	35	160
RS50A	37	50	215
RS50M	37	50	240

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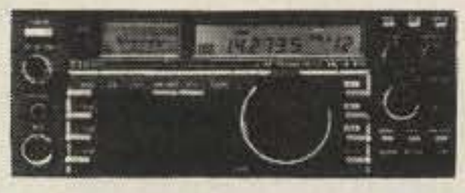

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2-117	2M	10-170W	$299.00
2-417	2M	45-170W	$299.00
3-22	220	2-20W	$112.00
3-211	220	2-110W	$299.00
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AL1200	1825.00	RCS4	134.50
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Model	List	Model	List
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LK800A	$2695	LK800NT	$2995
LK550	$1895	AT 3000	$ 499

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CIRCLE 122 ON READER SERVICE CARD

CQ World-Wide DX Contest All-Time U.S.A. Records

BY FREDERICK CAPOSSELA, K6SSS

Tabulated below are the record-high scores achieved by U.S. Contesters in the CQ World Wide DX Contest. Number groups following calls and bands are: year of operation, total score, contacts, zones, and countries.

PHONE

Single Operator/Single Band

1.8	WB9HAD('87)	27,181	157	23	54
3.5	K7SS('86)	217,038	828	31	91
7.0	W7RM('85) (Opr. W7WA)	243,270	813	31	71
14	K1OX('85) (Opr. KC1F)	1,131,328	2,176	36	140
21	K3RV/4('86)	925,031	1,821	35	138
28	N7DD('80)	754,536	1,730	36	113

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	27	8	19
K1AR	3.5	168	24	80
(1985)	7.0	97	22	67
4,007,648	14.0	1,073	34	116
	21.0	1,007	28	109
	28.0	98	13	36
	Total	2,465	129	427

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	34	14	30
KX4S	3.5	208	24	80
(1985)	7.0	222	30	101
4,603,120	14.0	1,167	34	134
	21.0	769	31	118
	28.0	41	15	40
	Total	2,441	147	505

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	109	8	16
N2AA	3.5	406	24	79
(1979)	7.0	366	28	84
13,299,750	14.0	1,646	40	152
	21.0	2,198	40	144
	28.0	1,354	36	120
	Total	6,079	176	595

CW

Single Operator/Single Band

1.8	K5UR('85)	47,005	219	25	60
3.5	W1FV('87)	270,692	790	28	90
7.0	K1OX('85) (Opr. KC1F)	439,632	1,055	32	110
14	K2VV('85)	655,046	1,567	35	107
21	W1RM('82)	483,560	1,196	33	107
28	N4WW('82)	394,940	1,064	33	97

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	59	13	31
K1EA	3.5	367	21	63
(1987)	7.0	612	35	91
3,961,980	14.0	825	33	87
	21.0	692	27	75
	28.0	53	15	31
	Total	2,608	144	378

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	50	13	39
K1GQ	3.5	317	23	74
(1987)	7.0	916	36	111
5,524,602	14.0	694	37	114
	21.0	695	29	99
	28.0	143	24	70
	Total	2,815	162	507

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
	1.8	72	14	27
W2PV	3.5	427	18	70
(1981)	7.0	1,101	30	103
10,431,729	14.0	1,389	35	118
	21.0	1,228	35	103
	28.0	1,050	34	106
	Total	5,267	166	527

Club record: Frankford Radio Club ('79) 173,821,640

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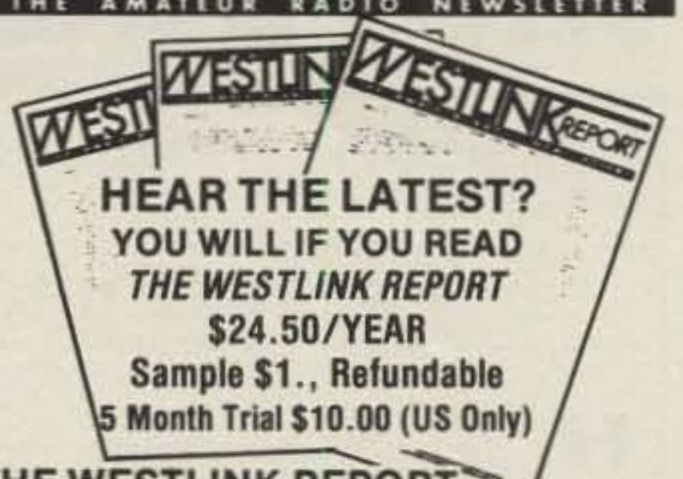

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IC-751A Gen. Cvg. Xcvr	1699.00	Call $
IC-575A 10m/6m Xcvr	1399.00	Call $
Receivers		
IC-R7000 25-1300 + MHz Rcvr	1199.00	Call $
IC-R71A 100 kH>-30 MHz Rcvr	999.00	Call $
VHF		
IC-228A New 25w Mobile	509.00	Call $
IC-228H New 45w Mobile	539.00	Call $
IC-275A All Mode Base w/PS	1299.00	Call $
IC-275H All Mode Base 100w	1399.00	Call $
IC-28A FM Mobile 25w	469.00	Call $
IC-28H FM Mobile 45w	499.00	Call $
IC-2GAT, New 7w HT	429.95	Call $
IC-2AT FM HT	319.00	Call $
IC-02AT FM HT, HP	409.00	Call $
IC-μ2AT Micro HT	329.00	Call $
IC-900 Six Band Mobile	639.00	Call $
UHF		
IC-475A All Mode 25w	1399.00	Call $
IC-475H All Mode 75w	1599.00	Call $
IC-48A FM Mobile 25w	509.00	Call $
IC-4GAT, New 6w HT	449.95	Call $
IC-4AT FM HT	349.00	Call $
IC-04AT FM HT	449.00	Call $
IC-μ4AT 440 FM HT	369.00	Call $
IC-3200A FM 2m/70cm 25w	649.00	Call $
IC-32AT Dual Band Handheld	629.95	Call $
220 MHZ		
IC-375A All-Mode, 25w, Base Sta.	1399.00	Call $
IC-38A 25w FM Xcvr	489.00	Call $
IC-37A FM Mobile 25w	499.00	Call $
IC-3AT FM HT	349.00	Call $
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TS-140S Compact, Gen. Cvg Xcvr	929.95	Call $
TS-680S HF Plus 6m Xcvr	1099.95	Call $
TL-922A HF Amp	1649.95	Call $
Receivers		
R-5000 100 kHz-30 MHz	999.95	Call $
R-2000 150 kHz-30 MHz	749.95	Call $
VHF		
TS-711A All Mode Base 25w	1029.95	Call $
TR-751A All Mode Mobile 25w	649.95	Call $
TM-221A Compact FM 45w	439.95	Call $
TM-2530A FM Mobile 25w	479.95	Call $
TM-2550A FM Mobile 45w	499.95	Call $
TM-2570A FM Mobile 70w	599.95	Call $
TH-215A, 2m HT Has It All	379.95	Call $
TH-25AT 5w Pocket HT NEW	349.95	Call $
TM-721A 2m/70cm, FM, Mobile	649.95	Call $
TM-621 2m/220, FM, Mobile	699.95	Call $
UHF		
TS-811A All Mode Base 25w	1,229.95	Call $
TR-851A 25w SSB/FM	749.95	Call $
TM-421A Compact FM 35w	449.95	Call $
TH-415A 2.5w 440 HT	399.95	Call $
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TW-4100A, 2m/70cm FM	599.95	Call $
TH-55 AT 1.2 GHz HT	499.95	Call $
TR-50 1w 1.2GHz FM	629.95	Call $
220 MHZ		
TM-3530A FM 220 MHz 25w	499.95	Call $
TH-31BT FM, 220 MHz HT	299.95	Call $
TM-321A Compact 25w Mobile	449.95	Call $
TH-315A Full Featured 2.5w HT	399.95	Call $

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FT-757 GX II Gen. Cvg Xcvr	1129.95	Call $
FT-767 4 Band New	1929.00	Call $
FL-7000 15m-160m Solid State Amp	1995.00	Call $
Receivers		
FRG-8800 150 kHz - 30 MHz	759.95	Call $
FRG-9600 60-905 MHz	699.95	Call $
VHF		
FT-212RH NEW 2m, 45w mobile	459.95	Call $
FT-211 RH 2m, 45w, FM	459.95	Call $
FT-290R All Mode Portable	599.95	Call $
FT-23 R/TT Mini HT	344.95	Call $
FT-209RH FM Handheld 5w	389.95	Call $
UHF		
FT-712RH, 70cm, 35w mobile	499.95	Call $
FT-711RH FM Mobile 35w	449.95	Call $
FT-73 R/TT Mini HT	349.95	Call $
FT-709RH FM HT 4w	389.95	Call $
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CIRCLE 151 ON READER SERVICE CARD

The Packet User's Notebook

a feature by
BUCK ROGERS, K4ABT

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Packet Enhancements, Amateur and Commercial

Having fun is what amateur radio is about. Having anticipated from the beginning the impact of packet on our hobby, I developed a sense of expectation about the many uses of packet in our future.

Before I get into this month's topic, I want to give a brief update to an earlier article about packet pictures. In the April 1988 issue of *CQ* I described a technique that allows us to pass high-resolution color pictures via packet. In that article I also described a very well-written and supported program called PACFILE. In describing the speed at which the picture could be transferred, I mumbled something like 3½ minutes for a picture being passed at 1200 BPS and 2 minutes for a picture being passed at 2400 BPS.

Well, for me that was fast—at that time. Since then a major packet controller manufacturer has acquired the rights to market the program. That has not stopped Bob Slomka, WD4MNT, the author of PACFILE, from making it even better. As I mentioned in the previous article, Bob is a perfectionist. The program and its features will never be complete until his 1.2 megabyte PC RAM runs out of memory or we find a way to tie his hands. In four years I have truly watched the PACPRO evolve into this feature-filled packet program, and he continues to build new and better versions.

The fun has begun, and Bob has added a very smooth-performing "compression routine" to PACFILE.It is not just any old run-of-the-mill compression routine, but one which makes use of just about every part of the PC that is capable of "smoking without exploding." We are passing pictures at 20 seconds flat, and I have indeed watched a high-resolution, error-free color picture appear on my screen from Larry, KF4JF, in 10 seconds (2400 BPS and without a digipeater). Now that is faster than a Studebaker.

Larry and I are beta testing this new PACFILE of the second generation. It has proven to be air-worthy thus far. Look for it to be released soon.

Bob has refined this compression scheme into something that is not just fun to use, but is also fun to watch. True, I have an old Tandy 1000®, and I mean old, because it was one of the first of the run. Everyone who knows me knows that if Tandy releases "one" I try to buy the first one, be it model I, CoCo* 1, 2, 3, 2000, or 1000 (not always my best decision). In any case, I have stopped that gamble. The reason I even mention this is because I have the original CPU, and ROM bios. Yep, that's right. I'm running a 4 MHz clock/timebase. For accuracy it is really 4.79 MHz. In any case, this 1000 is doing nothing short of "smoking" when I send or receive a picture via packet with this new PACFILE. As it was with the original PACFILE, I felt that somehow Bob had inserted a shot of vitamin "Z" into the code to feed the CPU as it went through. That CPU has to be working at United States Marine Corp double-time to handle the code switching inside. Add to this already solid-state "spontaneous combustion" the compression of a 17,000 byte picture and you've got a silicon brush-fire. What I am alleging is this compression is being done "on the fly"—in real-time. As the pictures are being sent they are also being compressed. As they are being received they are being decompressed. You want to know something? I think it is just short of miraculous. My 4 MHz clock/CPU is able to handle it, and somehow it does so in both "states" (transmit and receive). I think Bob has now developed an obsession to see how much my 1000 will take before it retires to "BOOT" Hill.

Bob has added several other features since the first article about PACFILE in April. In addition to invoking the compression routine with **ALT F2** key, you can still continue to use the old way with the **ALT F1** key (no compression). Another nice feature is the new print routine within the program. It can be executed with the **F5** key (**Shift/F5** for reverse print) while viewing a picture on the screen. The picture is printed on EPSON or IBM-compatible graphics printer (dot-matrix) full page, length ways, and with the same aspect ratio as the screen. Adding files, deleting files, page-back buffers, and renaming pictures or files before sending are all new additions, and there are more, but space here is limited.

Bob, and many like him, are making packet so much more enjoyable for us. Take time and write to him and tell him how much we appreciate his efforts: c/o Bob Slomka, WD4MNT, Rt. 2 Box 1028 Grandview Drive, Cordele, GA 31015.

I have received many letters and questions about PACFILE since the first article appeared in the April issue of *CQ*. In response to many questions about PACFILE, I furnish the following bits of information.

Q: Does it work with only one or two kinds of packet controllers?

A: PACFILE works with all of the packet controllers known to this author.

Q: Does PACFILE work with all computers?

A: It is PC and MS DOS based, and it uses hardware hand-shaking. This requires all flow commands to be turned off within the TNC. The nature of PACFILE also requires **SCREENL** be set at zero (0).

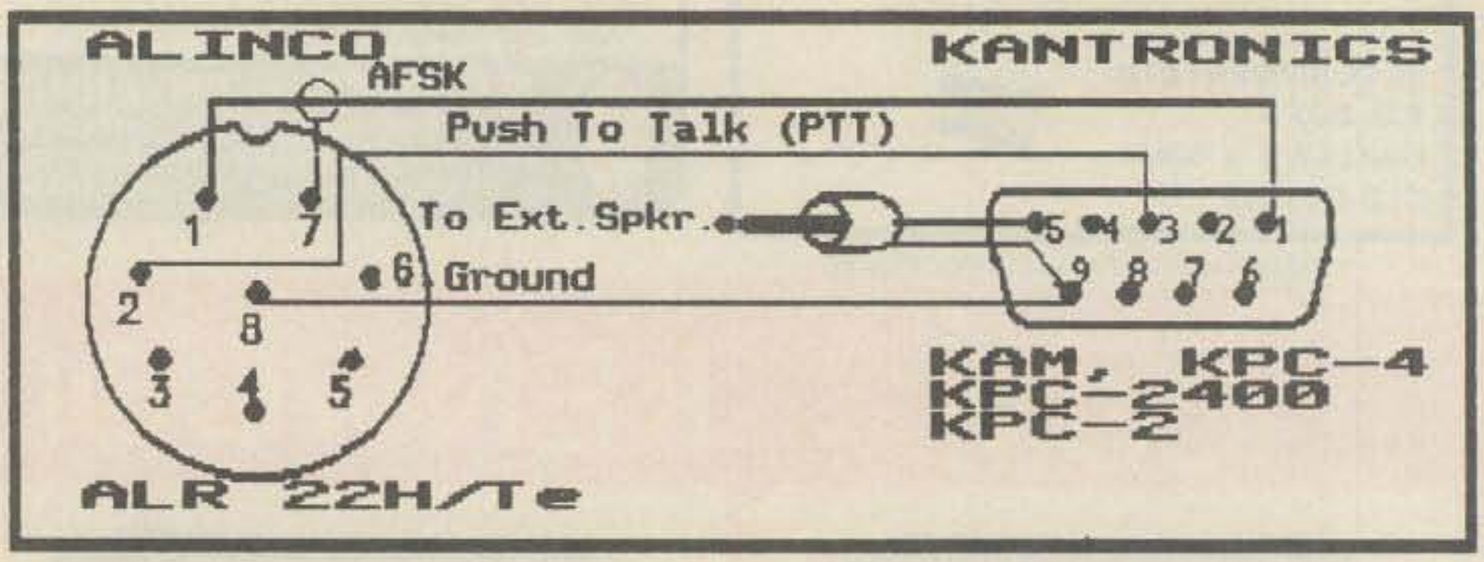

Fig. 1– Wiring diagram for connecting Alinco ALR 22 transceivers to Kantronics TNCs.

Packet Creativeness Can Cause Commercial Competition!

Many times we amateurs unwittingly open a new avenue for the free-enter-

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prise system to take an abrupt right turn. We contribute more to the advancement of the higher technologies than we are given credit for. It is the nature of the beast. The inquisitive mind of the amateur is the blessing with which we are cursed. (Now there is a line to ponder for awhile!) Very seldom are we ever content with being still or sitting idle. The true amateur is always trying some new idea or adding to someone else's. One enhancement adds to another until the original idea has evolved into something totally new and different. This can be related to the evolution of the high-technology process as a whole.

Here is the point! Law enforcement can use packet to send and receive encoded traffic to other municipalities or law-enforcement centers. They can indeed utilize our same system directly in their vehicles. The packet picture transfer capability can surely be utilized as a faster means of "wanted poster" distribution of a suspect and to a much wider area. The transceivers are already in place. Most law-enforcement agencies have multi-frequency capability and are fully capable of passing 2400 BPS. To explain further, a city or county could send a photo of a lost or missing child to a neighboring county in a matter of minutes. The same applies to a printout or hard-copy description of a suspect involved in a crime. Many times I have listened to the local law-enforcement agency on the police monitor as they attempted to give out a description of a wanted person. The dispatcher had to repeat the transmission several times because of lack of clarity or surrounding noises. A read-out, or even better a hardcopy printer, would alleviate this problem. There are small thermal printers which will easily operate in a vehicle to serve the same purpose. This is of even more importance to the "beat" patrol person, since he or she is sometimes away from the vehicle when the "be on look out" (BOLO) is issued.

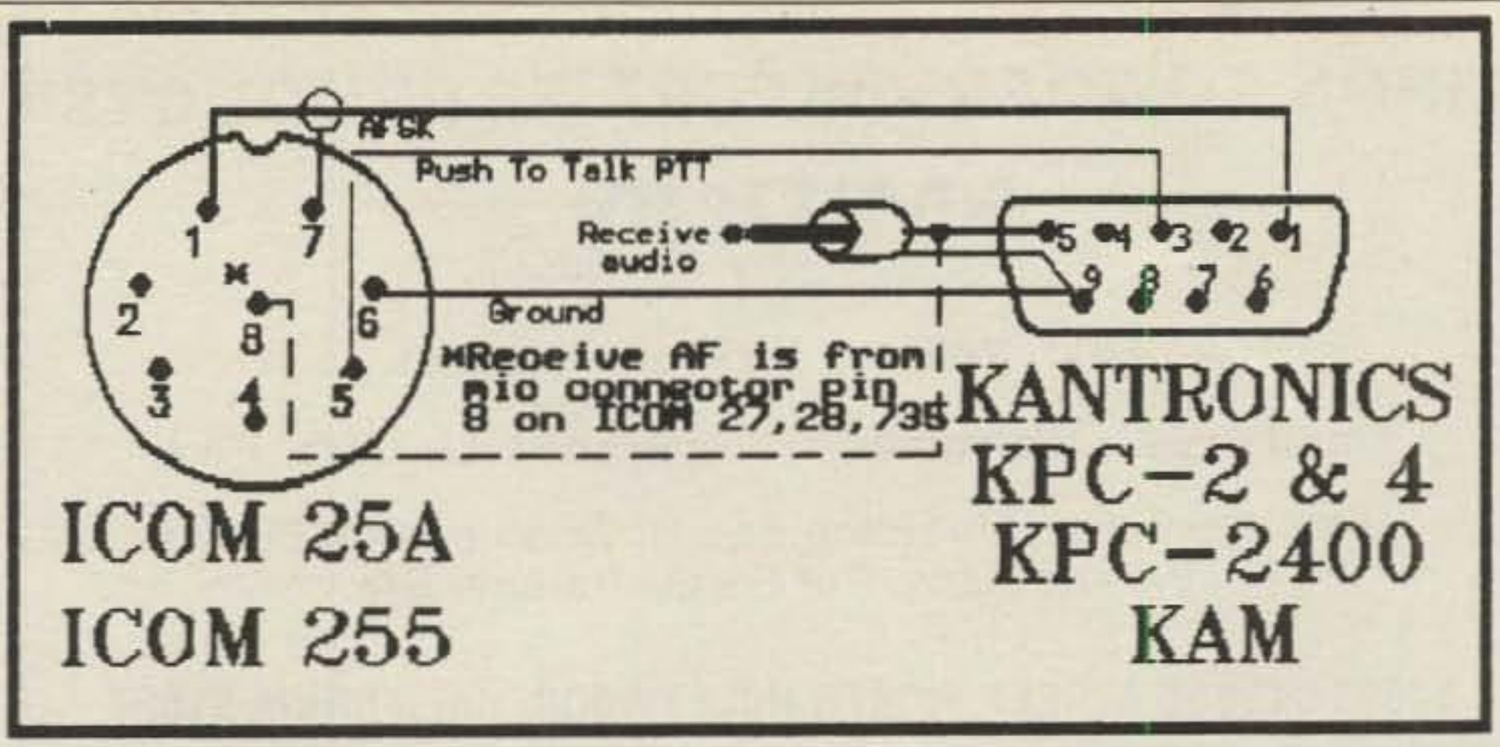

Fig. 2– Wiring diagram for connecting ICOM 25A/255 series transceivers to Kantronics TNCs. On most recent ICOM radios using an 8-pin mic connector, you will find receive audio on pin 8. Or you can use the external speaker jack if you cannot locate a pin with audio.

Another application of packet in the commercial sector is similar to the those found in the amateur packet fraternity. How many times have you been on a job with your portable phone and missed a call? It happens. How many times have you had your "beeper" or "pocket pager" on and found the battery was dead or that you had missed a call for some other reason? It happens. There is a way to beat this one also! (I hope there are some enterprising entrepreneurs reading this.) The RCC system or the private user could

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even look into the addition of this next capability to his two-way radio system.

The simple addition of a packet controller with "mailbox or PBBS" capabilities would solve many a lost call or message by being able to use a portable packet station in the car or briefcase to access mail or notes left in the packet mailbox.

The mailbox can be a "community system," since the firmware-type PBBS will allow only the user of a given call sign to read his or her own mail.

I know of a lumber company that has a modem set up so some of their customers can call in via telephone modem and place an order for materials. The order is dumped to hardcopy as it comes in.

By applying packet radio techniques to this idea, the building material company and the construction contractor could make use of a commercial portable packet system and do so from the job site. Another aspect of this packet radio use is the receiving terminal would not have to be attended, although the connect bells on many packet controllers would be a good attention getter to advise the receiving station that activity is occurring on their system. This provides another consideration. The order is in text and is dumped to printer, so the order is defined, and there is no mistaking the types or description of the materials ordered.

This is only the beginning of the commercial uses of packet radio. Maybe that is why the FCC and the governing bodies are allowing some privilege relief in some areas of amateur radio. In addition to developing a new field of employment, it also expands the base of communications, not to mention a future source of surplus amateur gear.

This brings up still another very touchy but interesting subject. I am as possessive as the next amateur when it comes to losing some of our valuable UHF spectrum and I mention this only as food for thought.

Before we "toss the baby out with the bath water," let's think about the latest proposal to allocate the first 2 MHz of the 220 MHz band to public and commercial use. What if it were to become a reality? One of the pending proposals was submitted by a major nationwide trucking and delivery company which owns and operates a massive fleet of vehicles. Maybe in two or three years, or as the radios begin to be replaced, there will become an abundant supply of 220 MHz transceivers on the surplus market, or maybe it will make a competitive 220 MHz amateur transceiver easier to market for some two-way radio manufacturers. We must face it: There are not a great number of 220 MHz transceivers to choose from at present, and those which are available are by no means low priced. There is a lot here to think about, so let's look before we leap.

Until next month, de Buck4ABT

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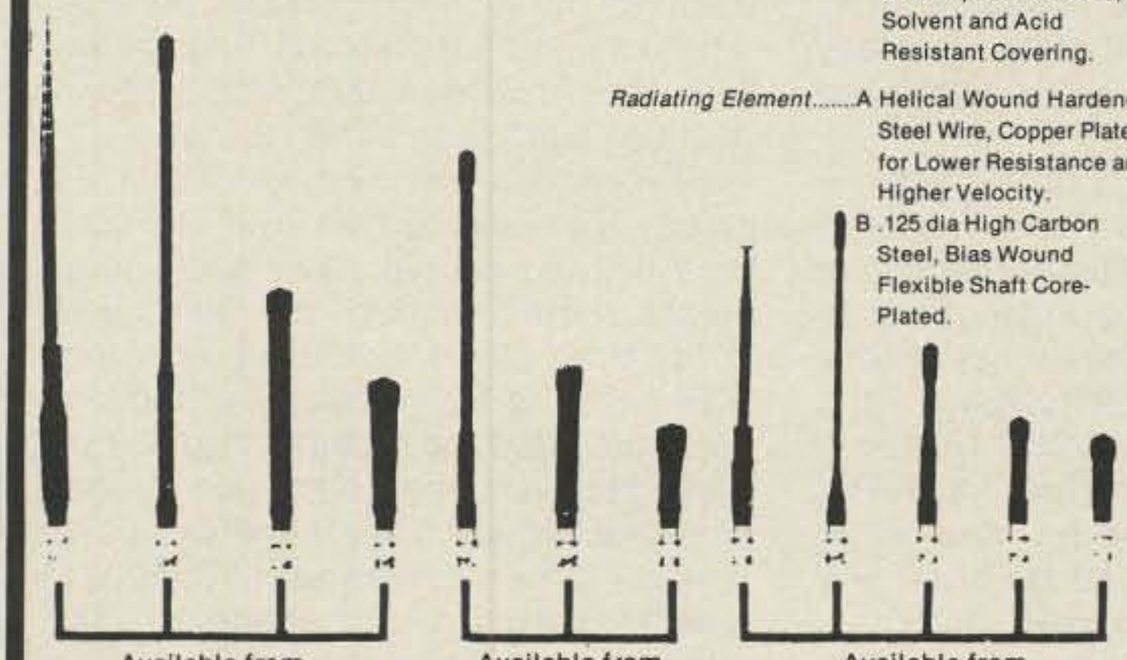

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One set of agreements (reciprocal operating) permits USA amateurs to operate in foreign countries, and it permits amateurs of those foreign countries to operate in this country. This is called *reciprocal operating*. In neither case are amateurs required to pass tests to operate in the other country; all licenses are accepted as proof of operating qualification. This reciprocal operating system is greatly appreciated by active amateurs who visit other countries.

The other set of agreements (third-party traffic) concerns the exchange of noncommercial (personal) traffic between people in different countries, via amateur radio, which is greatly appreciated as a person-to-person service.

Table I shows the countries with which we have reciprocal operating (R) and/or third-party traffic (T) agreements. The most commonly used call sign prefixes are included, but many other call sign prefixes are used on the air.

Reciprocal Operating and Licensing

The FCC only issues reciprocal operating permits to visiting alien amateur radio operators who are licensed by (and are citizens of) the indicated countries. USA citizens are not eligible to receive an FCC-issued reciprocal operating permit. Similarly, an alien holding a USA amateur radio license is not eligible to receive an FCC-issued reciprocal operating permit. If an alien amateur holds an FCC-issued reciprocal operating permit, it is superseded by whatever FCC-issued USA amateur radio license she/he obtains. In this case, the alien's operating privileges are no longer related to her/his home country's privileges; they are the privileges

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Eleven-year-old Terry Horst, KA3SEV, of Sharpsburg, Maryland, shares a station with her father (Larry, KA3SDJ). They use a Heath HWA5400 transceiver with a homemade 4-element Yagi-Uda. Terry has talked with amateurs in four countries. She is a sixth grade student attempting to introduce her classmates to the exciting world of amateur radio.

which are related to the class of FCC-issued amateur license she/he earned. Foreign amateurs are encouraged to obtain USA licenses if they are going to be in this country a long time. Except for representatives of foreign governments, anyone may apply for a USA amateur radio license, as issued by the FCC. Such applicants simply have to pass the same examination elements that are administered to Americans. Alien amateurs may apply for a permit to operate from any area where amateur radio is controlled by the FCC.

Alien amateurs may apply for a permit by completing an FCC Form 610-A, attaching a copy of her/his (foreign) valid amateur license, and mailing these items to the Federal Communications Commission, P.O. Box 1020, Gettysburg, Pennsylvania 17326, USA. Some USA missions (in foreign countries) have FCC Form 610-A, and it can be obtained by writing to the FCC, 1919 M Street NW, Washington, DC 20554, USA. An FCC-issued permit is valid for one year, until the alien's home country amateur license expires, or until the alien obtains a USA amateur license, depending on which occurs first.

Operating privileges of a permit holder are detailed in 97.311 of the FCC Rules and Regulations. Part 97 governs the USA amateur radio service. Basically, the permit holder is limited to the operating privileges that apply to her/his class of license in her/his home country. However, FCC regulations must be obeyed and USA Extra class operating privileges may not be exceeded by reciprocal licensees, regardless of the privileges existing in their home countries. As an example of this, reciprocal licensees are not allowed to transmit (on voice) in the 14,100 to 14,150 kHz portion of the 20 meter DX voice segment. Reciprocal permit holders do not all have Extra class privileges. As an example, a permit holder who has a home country license equivalent to the USA General class license is restricted to the operating privileges of a USA General class licensee. Violations should be reported to the FCC.

The exact call sign shown on the permit must be used by the reciprocal licensee when identifying her/his station. The appropriate USA letter-numeral prefix precedes the reciprocal licensee's home call sign. As an example, if CP5WDX is operating in California, his identification is W6/CP5WDX (code) or W6-stroke (or slash) -CP5WDX (voice). The entire call sign must be used when identifying a station; in this example, do not shorten it to W6/CP5WD. The reciprocal licensee is required to indicate (in English) the approximate geographic location (city and state, etc.) from which she/he is operating. This information is required at least one time during each contact. Canadian amateurs still identify the original way with the American indicator following their call sign, such as VE7SR/W6.

USA amateurs who want to obtain reciprocal operating permits from the countries with which we have such agreements should request the appropriate forms from officials of those countries. USA-based foreign embassies and legations may have the required forms. If not, they should be able to provide information about where such forms can be obtained. Forms may also be obtained by requesting them from the amateur radio licensing authority of the country you intend to visit. Information on this subject is available from the FCC, Personal Radio Branch/ssd/prb, Room 5322, 1919 M Street NW, Washington, DC 20554 (telephone 202-632-4964). The ARRL has a re-

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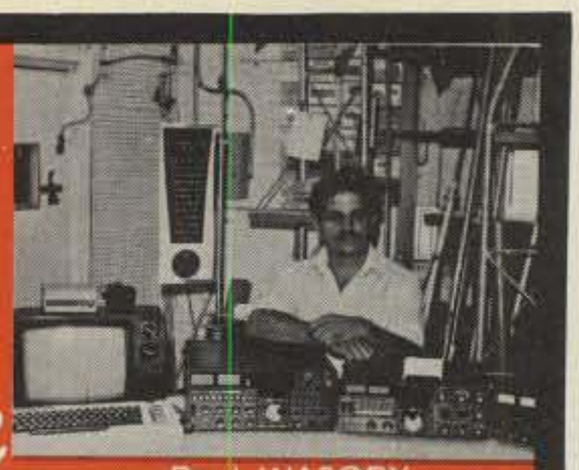

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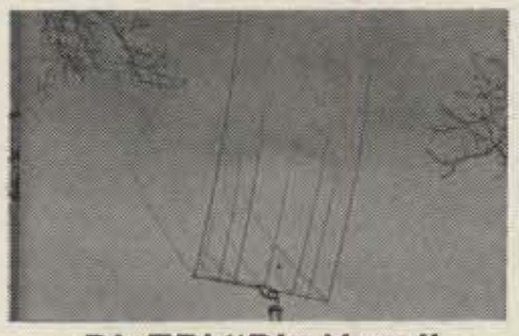

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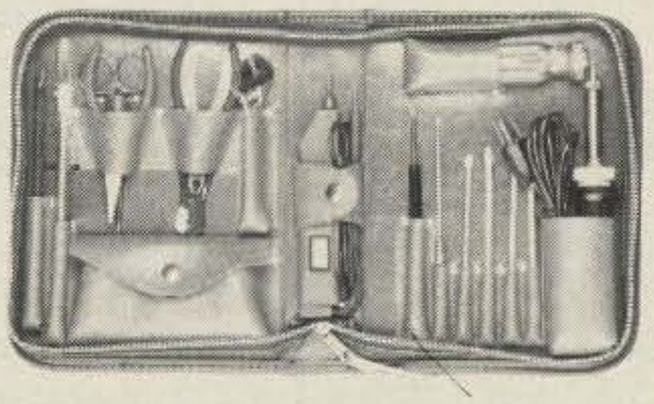

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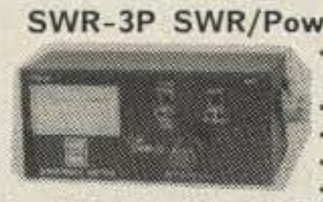

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W. German Federal Republic	DL	*		Solomon Islands	H44	*	
Ghana	9G1		*	Republic of South Africa	ZS	*	
Greece	SV	*		Spain	EA1–EA5/EA7	*	
Grenada & Dependencies	J3	*	*	Surinam	PZ	*	
Guatemala	TG	*	*	Swaziland	3D5		*
Guyana	8R1	*	*	Sweden	SM	*	
Haiti	HH	*	*	Switzerland	HB9	*	(4)
Honduras	HR	*	*	Trinidad & Tobago	9Y4	*	*
Hong Kong	VS6	*		Tuvalu Islands	T2	*	
Iceland	TF	*		United Kingdom	G, GA, GI, GM, GW	(5)	(6)
India	VU	*		Uruguay	CX	*	*
Indonesia	YB	*		Venezuela	YV	*	*
Republic of Ireland	EI	*		Yugoslavia	YU	*	

Notes

(1) No reciprocal operating permits are required between Canada and the United States.

(2) Also applies to Greenland.

(3) Also applies to French Guiana, French Polynesia (Gambier), Marquesas, Society, and Tubai Islands, plus Tuamotu Archipelago), Guadeloupe, Ile Amsterdam, Ile Saint-Paul, Iles Crozet, Iles Kerguelen, Martinique, New Caledonia, Reunion, Saint Pierre and Miquelon, plus Wallis and Futuna Islands.

(4) USA/ITU agreement authorizes third-party traffic to be exchanged between the USA and 4U1ITU (Geneva, Switzerland) and 4U1VIC (Vienna, Austria).

(5) Reciprocal licensing also applies to Bermuda, British Virgin Islands, Cayman Islands, Falkland Islands, Gibraltar, Montserrat, Saint Helana, plus Turks and Caicos Islands.

(6) Third-party traffic may be exchanged with United Kingdom special events stations (GB prefixes), except stations with the GB3 prefix.

Table I– Countries with which we have reciprocal operating (R) and/or third-party traffic (T) agreements.

ciprocal licensing expert who provides names, call signs, addresses, telephone numbers, and related data in response to requests for reciprocal licensing information received from American amateurs. The ARRL's address is 225 Main Street, Newington, CT 06111.

When USA amateurs operate (as reciprocal licensees) in other countries, they must abide by the regulations which apply to those countries. ITU Region II (North, Central, and South Americas) regulations do not go with you when operating in ITU Region I (Europe and Africa) or ITU Region III (Australasia and the rest of the Southern Hemisphere). All licensees must abide by the radio regulations of the International Telecommunications Union (ITU).

Third-Party Traffic

Third-party traffic involves at least one person in addition to the operators who are handling the traffic. Third-party traffic includes message traffic handled directly between amateurs and telephone (fone) patch traffic, in which people (not just amateurs) speak to each other directly (normally using the telephones in their homes) via amateur radio. International third-party traffic must be in English (voice), or using the International Morse code for code traffic. Third-party traffic must be of a personal nature; business messages are prohibited, except during emergencies. Amateurs are not allowed to accept money, services, or goods in exchange for handling third-party traffic. Only personal messages may be handled by amateurs radio operators under normal circumstances. These messages must be such that they would not normally be sent by any existing means of electrical communications, or except for an amateur radio station being available.

The call signs of both (foreign and American) stations must be transmitted to identify stations handling third-party traffic. Your own call sign (alone) does not suffice in this case.

Expanding The Opportunities

The US Government is willing to establish reciprocal operating and/or third-party traffic agreements with other countries. Such agreements are negotiated

Scott Dolan, KB8EDV, is on the left and Phil Brent, KB8DZQ, is to the right in this picture. They are students at Saints Peter and Paul Seminary High School near Newark, Ohio. Bob Cashdollar, NR8U, supplied this picture.

through the US Department of State. The support of the other country's amateurs is necessary to initiate meaningful negotiations. It is best to have action initiated by the country seeking to reach an agreement with the USA, since their cooperation is essential in getting the task completed. Our government is receptive to providing draft notes, which could form the basis of such agreements, to any interested country. Notes can be requested from the US Department of State, or from the Federal Communications Commission. The FCC's address is Washington, DC 20554, and requests should be directed to the Chief of the Spectrum Engineering Division. DX amateurs are urged to initiate appropriate action in their countries, if they do not presently have both agreements with the USA. American amateurs could help expand these lists by discussing these agreements with foreign amateurs, particularly when visiting their countries.

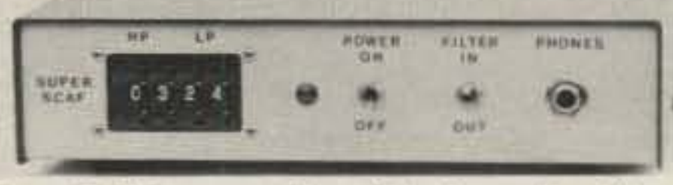
73, Bill, W6DDB

Photographs Wanted

Photographs of Novices in their shacks provide introductions to a few of the newer amateurs. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year *CQ* subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest *CQ* issue. One award is made each month, no matter how many photographs are printed. DX amateurs, who frequently work the American Novice bands, are also urged to submit photographs.

• SUPERSCAF •

(A Switched-Capacitor Audio Filter)



SuperSCAF is a versatile switched-capacitor filter for eliminating interference and noise on CW, SSB, RTTY, AMTOR, PACKET and other narrow band modes. Extremely steep filter skirts remove adjacent clutter and noise to enhance weak signal reception and greatly increase intelligibility and listening comfort.

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SuperSCAF is available assembled or in kit form.
No adjustments, calibration, or test equipment are required. The kit can be completed by most builders in one or two evenings. SuperSCAF is available in kit form for $139.95 and assembled for $179.95. Please add $7.00 shipping and handling. Order from AFtronics, Inc., PO Box 785, Longwood, FL 32752-0785. Florida residents should include state sales tax.

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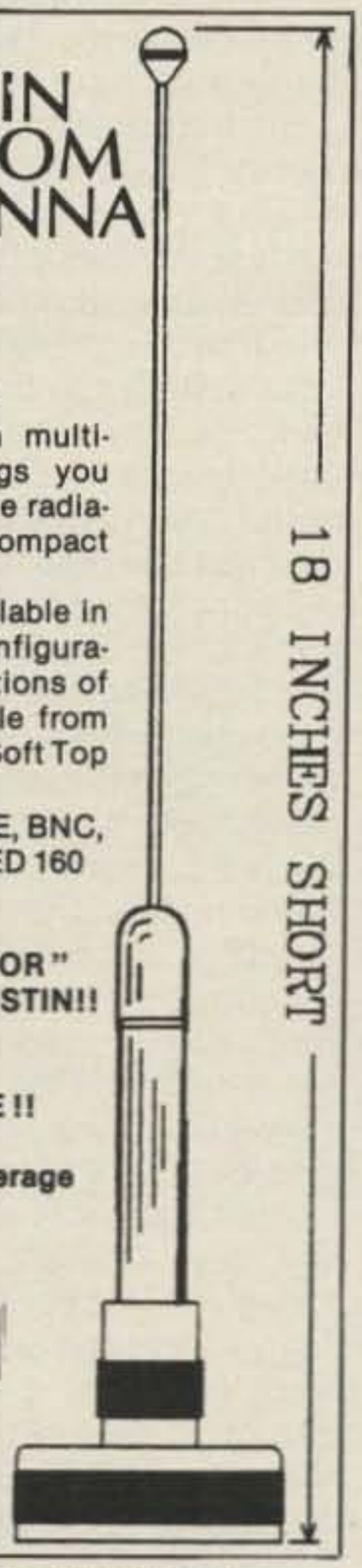

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CIRCLE 46 ON READER SERVICE CARD

Awards

a monthly feature by
DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for October is:

John F. Kray, KA2CNG USA-CA All Counties #551, Mixed, 10-17-87

"I was a 'depression boomer' born in the spring of 1932 in Dauphin County, Pennsylvania. My teenage years were spent living in the country. Two events of the time influenced my interest in radio, although ham radio did not become a part of my life for almost 50 years. The first was WW II and gas rationing, which forced people to stay close to their homes, thus restricting travel. The second was the widespread fear of contracting polio. Polio seemed to be associated with big cities and large crowds. So as a teenage boy growing up in a rural environment, there was little to do but ride my bike, play with friends, read books, or listen to the radio (there was no TV, believe it or not). My favorite radio programs were *The Long Ranger*, *The Green Hornet*, and *The Shadow* (who worked for IBM, my present employer).

"One day in *Popular Science* magazine my friend and I discovered an article on how to construct a 'tooth-brush twin crystal set.' My mother supplied us with several old tooth brushes. We looked through our fathers' work benches and found some tacks and wire, but there were still a few critical parts to be obtained. We then turned to a neighbor who was in the radio repair business. We showed him the article and told him what we had. He said, 'Well, you still need a crystal, some coils, and a 'cat's whisker.' My friend and I wanted to impress him with our knowledge of the radio business. I piped up, 'Oh, no! We don't need any cat's whiskers, since I have a cat who has plenty.' He got a big laugh over this, and we got our first practical lesson in electronics—namely, that 'cat's whiskers' were not obtained from real cats!

"As our knowledge of the real world of radio construction grew so did our appetite for new and better things. I still have (and it still works) a 1938 GE portable AM and shortwave radio that was my father's pride and joy. It is as big as a breadbox and has a long cord to plug it into the wall. The transistor had not yet been invented. Another article in *Popular Science* outlined a two-tube portable radio built in a cigar box. I will never forget that the tubes were 1S4's. We built these radios and were the envy of all our friends. We could

333 South Lincoln Ave., Mundelein, IL 60060

John Kray, KA2CNG, proud holder of USA-CA All Counties #551, 10-17-87.

ride our bikes and at the same time listen to our battery-powered portable radios on headphones. This was real state-of-the-art stuff back in 1943.

"In the summer of 1950 I spent all the money I earned mowing lawns to purchase a truly portable radio. It was one of the first transistor radios of its day. It still sits on the workbench in the garage. When I am working in the garage, I usually have it turned on. It runs on three D-cells, but only picks up one local station. I used to work for GE and have often wondered if they would be interested in buying back this relic for a museum.

"I graduated from high school in 1950 and that fall entered Penn State to study electrical engineering. In January 1955 I graduated with a degree in electrical engineering and a job offer from IBM in Endicott, New York. In my senior year I took the first course in transistors ever offered at Penn State. Our text book was the Proceedings of the IRE. A few weeks before graduation I wrote IBM a letter saying that I had decided not to accept their offer. Instead, on the first of February 1955 I traveled to the Philadelphia Navy Yard and enlisted in the Navy. They sent me home for a month and told me to report to the Navy Officers Candidate School in Newport, Rhode Island on the first of March. Sixteen weeks later I emerged from Newport, a newly commissioned Ensign in the US Navy Reserve. I spent the next five years at the Jacksonville, Florida Naval Air Station where I was the

"County Line!" by John, KA2CNG, Vestal, New York.

Maintenance and Electronics Training Officer for Detachment Two of the Fleet Aviation Electronics Training Unit. About two years later my skipper, CDR Robert Taylor (not the movie actor), called me into his office. He handed me a set of LTJG bars and told me that it was not right that I was the only officer in his command never to have served aboard ship. The aircraft carrier *USS Roosevelt* was stationed at May Port in Jacksonville, so he sent me aboard for a five-day training mission for pilots and crew members I had helped to train. The TACAN (Tactical Azimuth and Range) navigational system was then state-of-the-art electronics, and I had an opportunity to see how it worked in night landing operations. I am probably the only Navy veteran of almost five years of service who can boast he spent a total of five days at sea!

"I left the Navy in the summer of 1959 and worked for several years for GE in Syracuse, New York in the field of Technical Communications. In 1963 I left GE and accepted a position as a Technical Writer for IBM at the same location where I had turned them down nine years before. Since then I have held numerous positions in IBM in technical communications, education, and programming.

"For many years, my uncle (Leo, USA-CA #209) urged me to become a ham. He said, 'With your knowledge of electronics, it should be a breeze.' The theory was always difficult for Leo, but he was a whiz with a key. For me it was just the opposite—learning the code was a real struggle and the theory was easy. Finally, in 1978, at age 46 (after two disappointing years dabbling in CB radio) I decided to take the plunge and got my license for ARS KA2CNG. Since then I have upgraded to General and Advanced class. I will never be an Extra class unless they cut the code requirement back to 13 wpm, or preferably, eliminate it. I sure

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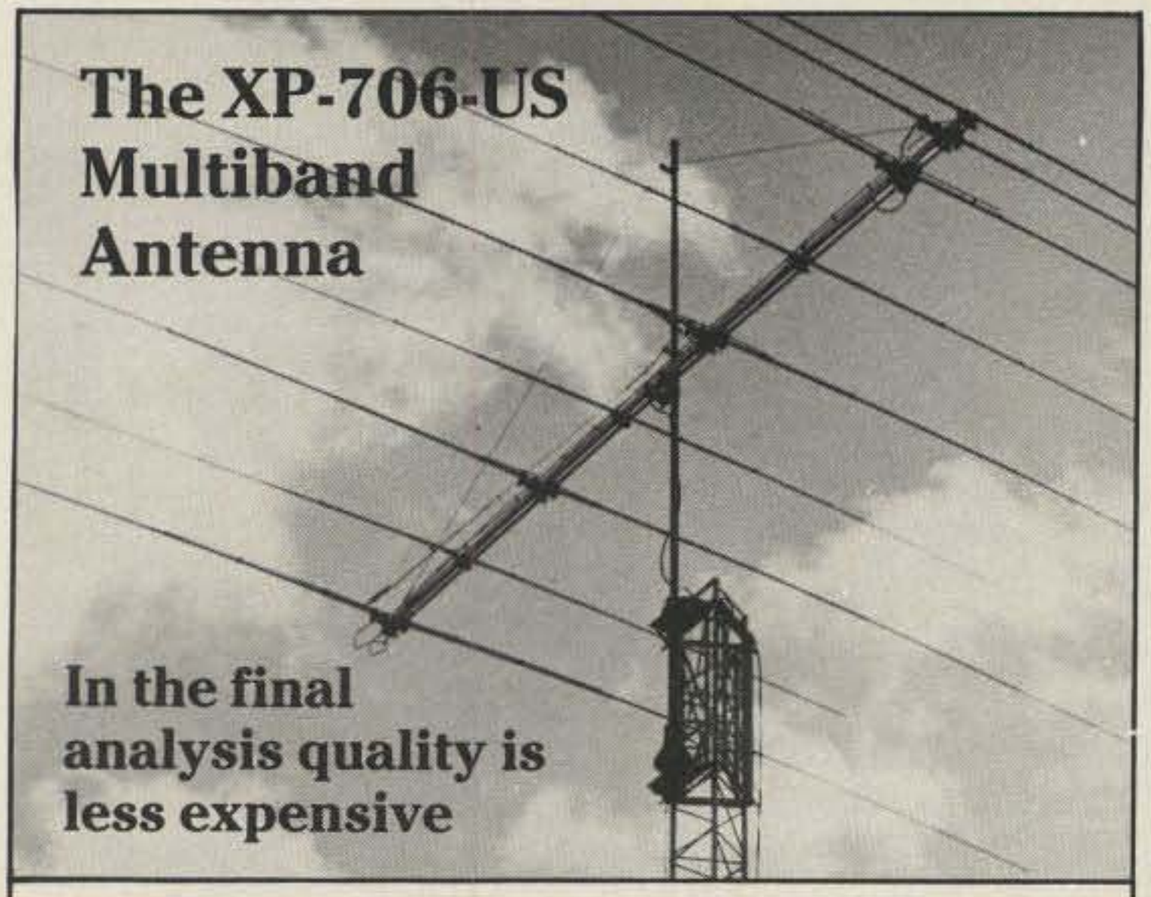

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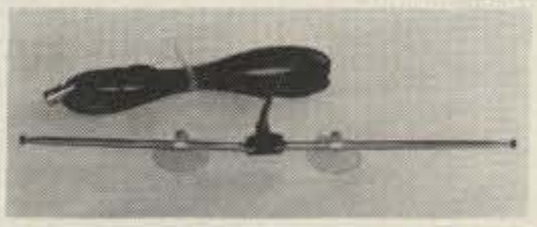

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CIRCLE 98 ON READER SERVICE CARD

USA-CA Special Honor Roll

Clifford A. Taylor, WB4FBS
All Counties #87, Mixed, 11-16-72
Endorsed All 20M Mobile SSB, 6-13-88

hope this does not offend my many county hunter friends who are active on CW. As they say, some of us have it and some of us don't. I am one of the don'ts as far as code is concerned.

"In the summer of 1979 Leo (79 years of age) traveled to my home in Vestal to make sure that I knew what County Hunting was all about and became committed to it. Luckily, it did not take long, because I believe Leo intended to stay until I was 'firmly hooked,' as they say. With Leo at my side in my 4-by-8 combination bathroom/hamshack, I made my first contact on 14.336 on June 18, 1979 with WØHEP on the county line of Albany, Wyoming and Larimer, Colorado. On the seventh of July 1987, exactly 2603 contacts later, I made a contact with KC7OD in Chouteau, Montana, for county number 3076.

I have many people to thank for this accomplishment. First of all is my wife, Anita, who has no interest in ham radio, although she is very tolerant of her husband who at times prefers to come late to dinner or forget to do an important chore just so he can 'ham it up.' I also owe a lot to my two daughters, Patricia, 22, and Catherine, 18, who have suffered the most because of my hobby. Many times while talking on the phone they have been interrupted by this garbled sound and have had to explain 'that's just my dad; he's on the radio again.' I have never had a TVI problem, but also have never been able to solve the phone problem. Any suggestions how to cure this, other than giving up my hobby or canceling my phone service?

"I especially owe a lot of thanks to all my fellow hams in the County Hunters who have helped me along the way. This includes not only the mobile stations, who at times have gone out of their way to get me a needed county, but also those who run the nets without whose efforts none of this would ever be possible. And then there are people like Paul, WA3TUC, and Arnie, K9DCJ, who always seem to be within earshot of 14.336 and willing to help.

"The only regret I have concerning County Hunting is that Leo, WB4AIL, could not be around to share in this accomplishment. Leo bacame a silent key in July 1986 when I still had about a dozen counties to go.

"My plans for the future are simple. You just can't forget the many good friends you make through this hobby. I will try to attend more conventions in the future, and put out more counties myself if and when I ever retire from IBM. And yes, to my wife's amazement, I will probably start all over again and try to do it the second time. 73 and good hunting to all my friends.—John, KA2CNG."

USA-CA Honor Roll

3000		**1000**	
KA5RNH	603	KD5YN	1021
2500		**500**	
NK7B	678	KD5YN	2257
G5PQ	679	HG9R	2258
1500			
KD5YN	836		
WBØSUN	837		

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to CQ is $4.00. For non-subscribers, it is $10.00. Initial application must be submitted in the USA-CA record book which may be obtained from CQ Publishing Company, 76 North Broadway, Hicksville, NY 11801, U.S.A. for $1.25. To qualify for the special subscriber rate please send a recent CQ mailing label with your application. To be eligible for the USA-CA, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending a SASE to the USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060, U.S.A. DX stations must include extra postage for air mail reply.

Awards Issued

Clifford A. Taylor, WB4FBS, added a very credible endorsement to his USA-CA All Counties #87, dated 7-12-87. On 6-13-88 Cliff received an endorsement for All Counties 20 Meter Mobile, SSB. Nice going, Cliff.

Joseph C. Cannon, Sr., KA5RNH, took that next-to-last step and received USA-CA 3000 #603, All SSB, dated 6-27-88.

Norman H. Friedman, NK7B, claimed and received USA-CA 2500 #678, Mixed, dated 6-6-88.

D.H. "Doug" Allerston, G5PQ, also added another endorsement to his certificate by claiming USA-CA 2500 #679, Mixed, dated 6-17-88.

Lowell Thomas, KD5YN, took a big step toward the ultimate goal and claimed USA-CA 1500 #836, USA-CA 1000 #1021, and USA-CA 500 #2257, All 20M SSB Mobile, dated 6-14-88.

Sue Strom, WBØSUN, received USA-CA 1500 #837, Mixed, dated 8-27-88.

USA-CA 500 certificates went to:

Lowell Thomas, KD5YN, USA-CA 500 #2257, All 20M SSB Mobile, dated 6-14-88.

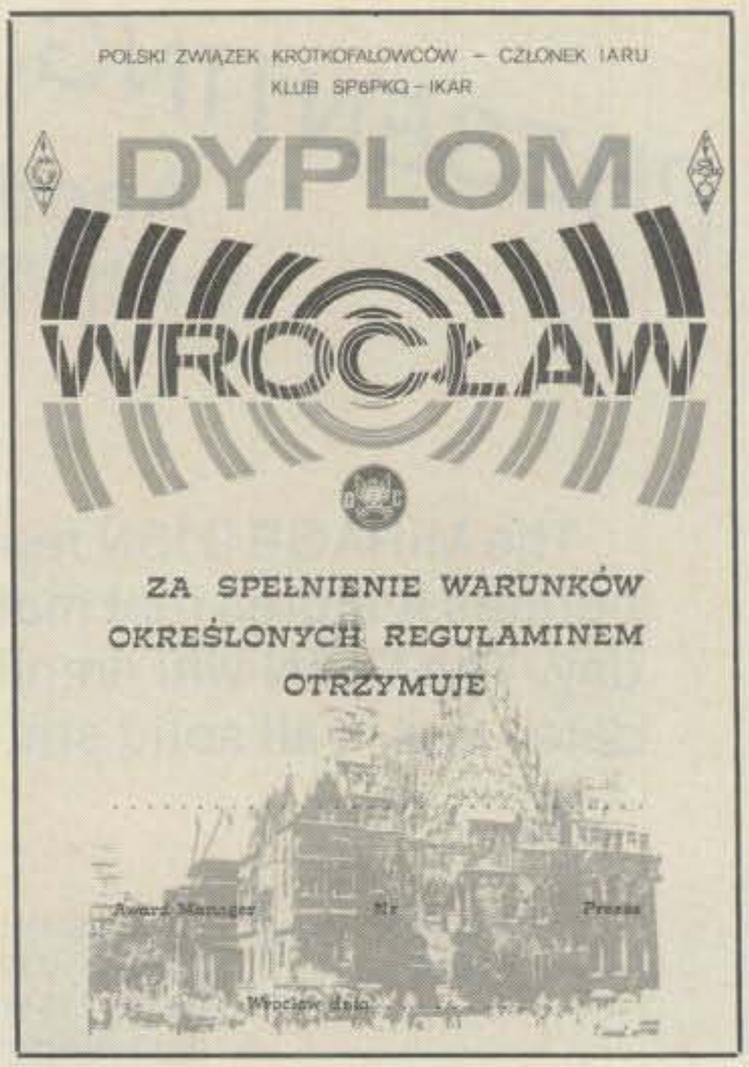
Ronai Sandor Radioclub, HG9R, USA-CA 500 #2258, Mixed, dated 6-28-88.

Awards Available

The Wroclaw Award. The Wroclaw Award is issued by the Polish Amateur Radio Union Club Station SP6PKQ, "IKAR," located in Wroclaw, Poland. The award is available to licensed stations for contacting stations in Wroclaw which have been operating since 6 May 1945.

Requirements: DX stations, 15 points; EU stations, 45 points.

Scoring: Each QSO gives 2 points; each QSO with SP6PKQ gives 5 points; each QSO made during the celebration of the "Days of Wroclaw" (6–10 May) counts double.



The Wroclaw Award offered by the Polish Amateur Radio Union Club Station, SP6PKQ, Wroclaw, Poland.

Contacts with stations may be repeated on all bands and with different modes of emission.

The same conditions are applicable for SWL stations.

Each application must be accompanied by sufficient funds to cover expenses (10 IRCs). Applications, confirmed by the applicant's club or by two licensed amateurs, should be sent to Klub Krotkofalowcow, SP6PKQ—"IKAR," P.O. Box 2190, PL 50-985 Wroclaw 47, Poland.

Nansen 1888—Sciare 1988 Award. *Sciare Magazine*, specializing in winter sports, is sponsoring the "Nansen 1888—Sciare 1988" Award to celebrate the Greenland ski crossing centenary and the enterprise realized by Nansen in 1888 in which the sport of skiing was popularized. The Norwegian explorer Fridtjof Nansen (1861–1930), professor of oceanography at Oslo University, ambassador to London, was promoter of the National Society (1919, Paris) and winner of the Nobel Peace Prize in 1922.

The award can be obtained by licensed radio amateurs and SWLs. All QSOs must be made in the period January 1 through December 31, 1988—phone, CW, RTTY, mixed.

100 points are required and are scored as follows:

F–Paris . . . . . 1 point
G–London . . . . . 1 compulsory
LA 1
LA–Oslo . . . . . 5 compulsory
OX . . . . . 10 compulsory
OZ 1
SM–Stockholm . . . . . 1 compulsory.

The same station cannot be contacted more than once. During skiing celebrations in Greenland performed by *Sciare Magazine* in June and July 1988, two stations were active—I2DMK (Max) and I2BVS (Enzo). QSOs with these stations count ten points, and can be counted more than once if on different modes and bands.

The award is free via the bureau. For direct mail submit 2000 Lire, $2.00, or 3 IRCs. Do not send QSLs. Submit GCR list to the award manager, Mario Ambrosi, I2MQP, via Stradella 13, I-20129 Milano, Italy.

Radio Club Nuevo 25th Anniversary Award. Radio Club de Nuevo Leon, A.C., is offering its 25th Anniversary Award to licensed amateur radio stations worldwide who make two-way contact with three amateur stations operated by members of the Radio Club de Nuevo Leon A.C.

Contacts made in the period July 24, 1988 through July 24, 1989 are valid. For purposes of this award stations operated by members of RCNL will be using the special prefix 4C2 instead of the normal XE2. All two-way contacts with stations operated by RCNL members in any band and mode authorized under Mexican regulations are valid for this award.

To apply for this award, send the Award Coordinator, by registered mail, a list of contacts showing date, time (GMT), frequency, mode, RST, and corresponding QSL cards together with $5 US (money order) to cover costs plus SASE and IRC. The Award Coordinator is Radio Club de Nuevo Leon A.C., Attn. Gino Decanini XE2GDD, P.O. Box #441, Monterrey, N.L. 64000, Mexico. Applicants will receive by return mail the award and QSL cards for contacts made.

Twenty-fifth Anniversary Award available from the Radio Club de Nuevo Leon A.C., Monterey, Mexico.

RCNL member stations are: XE2s—ABA, ALK, BPO, CGI, E, ECA, F, FD, FL, GDD, GHA, GN, HS, JAR, JFR, JJG, KAW, KO, LGS, LI, LTH, M, MCQ, MRA, MRF, MRG, MTO, NGH, MW, OCM, PAE, PAC, PAG, PAY, PEA, PP, PPP, PPT, PQ, QD, RHC, X, MSV, LMO, and XE1AZ.

Central Radio Club of Czechoslovakia Awards. The two following awards are issued by the Central Radio Club of Czechoslovakia. General rules applicable to both awards are:

1. A list of QSL cards, certified by the applicant's national amateur radio society, must be submitted. If such a certified list is not available, all QSL cards must be submitted.

2. The awards are free of charge for members of clubs and associations accepting this rule reciprocally. The fee for all others is 5 IRCs (except for "P75P" for which the fee is 10 IRCs).

3. Any altered or forged confirmations will result in disqualification of the applicant.

4. All applications must be sent to Central Radio Club, Awards Manager, P.O. Box 69, 113 27 Praha 1, Czechoslovakia.

P75P Award by the Central Radio Club of Czechoslovakia for working ITU zones.

P75P Award. This award is available to licensed radio amateurs and SWLs. All contacts after 1 January 1960 are valid. There are no band or mode limitations. The award is given for QSOs with at least one station located in each of the geographical broadcasting zones defined by the ITU Geneva Conference of 1959 (ITU Zones).

The award is available in three classes: First Class 70 zones; Second Class 60 zones; Third Class 50 zones. The zones should be determined in accordance with a special map and list available from the Central Radio Club of Czechoslovakia for 3 IRCs.

The size of the award is 28 × 37 cm. It is printed in silver, dark blue, and light blue on a white background.

S 6 S Award. This award is available to licensed radio amateurs. All contacts after 1 January 1950 are valid. There are no band restrictions. The contacts must be

S 6 S Award available from the Central Radio Club of Czechoslovakia for working continents.

in either SSB, CW, or RTTY mode (not mixed). Applicants must submit proof of two-way contact with each of the six continents (Europe, North America, South America, Asia, Africa, Oceania). Endorsements (stickers) are available for single band: 3.5, 7, 14, 21, 28 MHz. The fee for each sticker is 1 IRC when not claimed together with the basic award. When claiming a sticker, the number of the basic award and the date of issue must be mentioned. A certified list must be submitted.

The size of the award is 31 × 24.5 cm and it is printed in red, black, and blue on a white background.

CU next month. 73, Dorothy, WB9RCY

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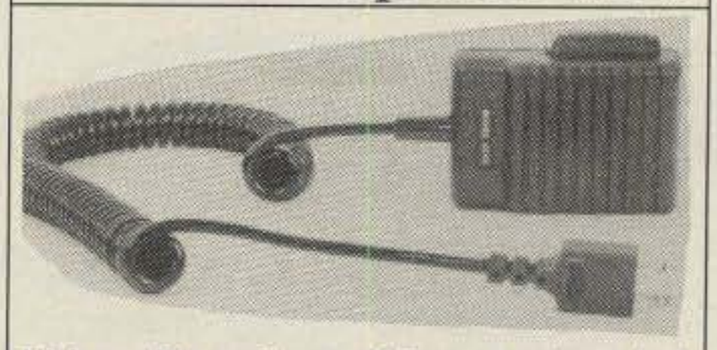

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MODEL	BANDS	LENGTH
GD-6:	80-40-20-17-12-10M	137'
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GD-9:	160-80-40-30-20-17-15-12-10M	255'

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VE2MNL, Michel: "I have installed my GD-7. Only one antenna to cover 7 bands with practically perfect SWR on all bands." **VE1AZZ**, Gordon on his GD-8: "I find the SWR exactly as you claimed." **VE7TH**, John on his GD-9: "FB on all bands. Great for DX." **VE7BKU**, Rob on his GD-8: "A great antenna. Excellent bandwidth." **VE1VCD**, Stu: "Very pleased with the GD-6/2KW. In less than six months operation have logged over 85 different countries. Recommend it to anyone considering a wire antenna."

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Antennas & Accessories

a monthly feature by
KARL T. THURBER, JR., W8FX

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

More Letters, More Books

Let's start with the letters, which this month include topics such as getting service on no longer manufactured amateur gear, the G5RV antenna, and do-it-yourself propagation forecasting.

From the W8FX Mailbag

R. L. Drake Equipment. A note from Edgar Roy Blakeburn, VE1XA, asked us if we knew how he might obtain an equipment manual for his Drake antenna MN-2000 antenna tuner, a very popular unit of the 1970s that is still performing well in many hamshacks today.

We knew that Drake, while still in operation and heavily into the television satellite receiving (TVRO) business, no longer manufactured amateur gear, but could still supply manuals and parts, and possibly do some repair work. Edgar confirmed this to me in a follow-up letter, as Drake had sent him what he needed at a reasonable cost.

In a note from Bernie Welch, W8IMZ, to *CQ* that appeared in last May's "Zero Bias" editorial column, Bernie reported that Drake's service department is still going strong. They have even updated some of their equipment at reasonable prices. If you need parts or service, contact Bill Frost at R. L. Drake Co., 540 Richards St., Miamisburg, OH 45342 (phone 513-866-3211).

G5RV Problems and Notes. Generally speaking, the G5RV is a reasonably trouble-free multiband antenna. We receive precious few letters from readers who have had problems with the antenna. Most such letters concern the G5RV version which uses a balun at the junction of the ladderline or openwire line and the coax downlead to the shack. Seems the balun tends to mess up things. In fact, in last April's column, I mentioned that I felt it is advisable to go with openwire or ladderline all the way to the hamshack, using an antenna tuner at the transmitter or transceiver.

On this point Riley Dunn wrote that his son bought a commercial G5RV kit, one with the fairly standard 102 foot flattop, a 31 foot length of 300 ohm parallel line, a balun or "transformer coupler," and a length of RG-8X coax. He ran into SWR problems on several bands with this configuration and using an MFJ antenna tuner ahead of a Collins transceiver.

My advice to Riley was to extend the parallel transmission line all the way from the flattop to the antenna tuner, dispensing with the balun and the coax link. While the optimum length for the feedline is open to discussion, and certain lengths may result in matching problems on some bands, the length isn't normally critical.

Of course, bringing parallel line into the hamshack can be a problem, and parallel line just isn't as easy to handle as coax. Something

Over the years R. L. Drake made some excellent amateur radio gear, much of which survives today. As we mentioned in this month's column, it's still possible to obtain service, parts, and manuals from Drake, even though they're now out of the amateur equipment manufacturing business. Their address: 540 Richards St., Miamisburg, OH 45342. (Photo courtesy R. L. Drake Co.)

I've used with good success is the Radio Shack #15-1200 "Wall-Thru" lead-in tube ($2.19) designed to neatly run TV lead-in through house walls up to 13 inches thick. Also, *The ARRL Antenna Book* has for years shown a feed-through scheme for going through a glass window.

Fred Bonavita, W5QJM, agrees with my April comment that the way to go with the G5RV is with 100% parallel line to the hamshack. Writes Fred:

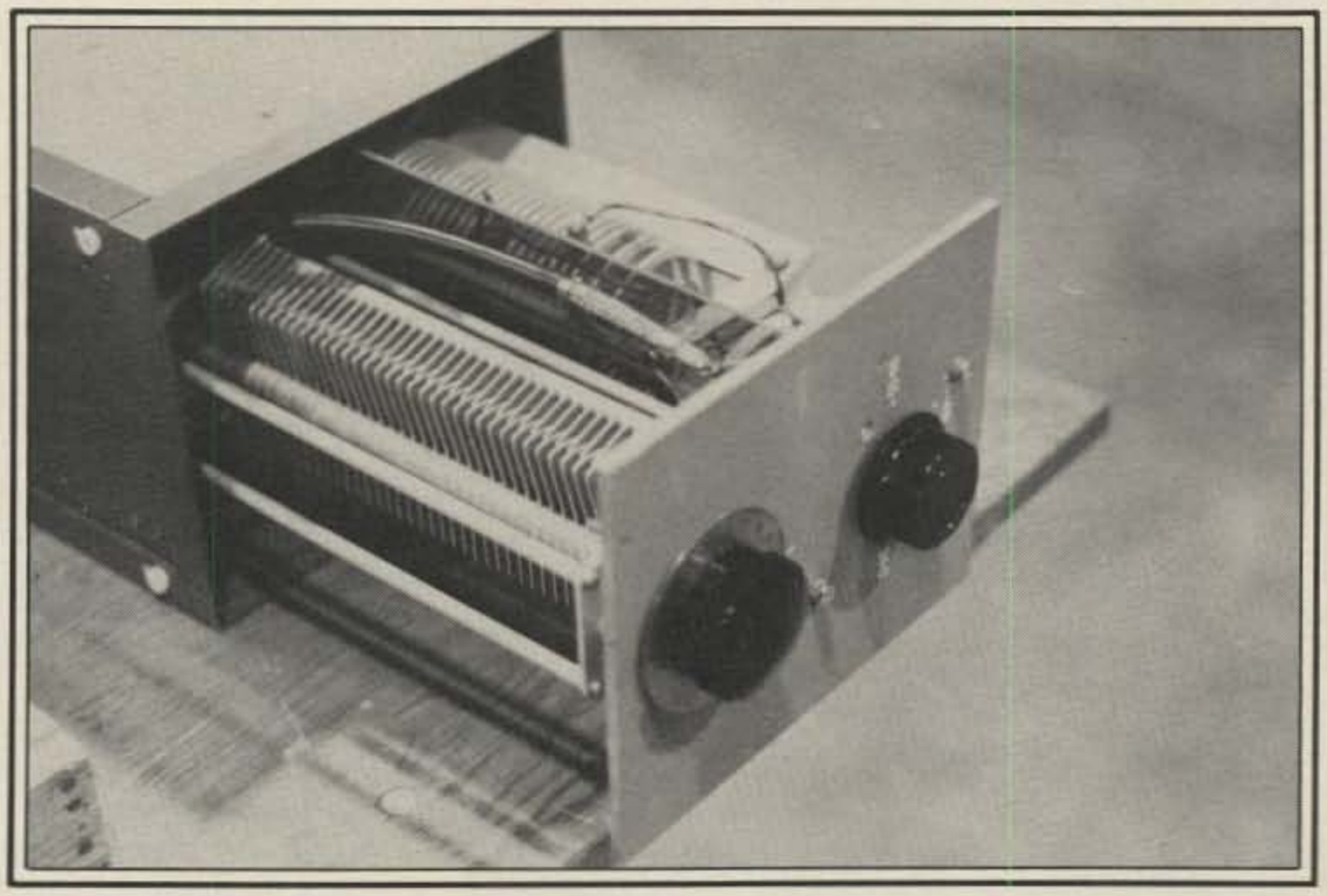
"You were right on target in your April column . . . I have argued exactly the same point for a long while. Getting away from coax not only gets more of the signal into the air where it belongs, but it results in all-around better performance for what perhaps is one of the best all-band antennas—some argue that it is *the* best—for us amateurs."

Fred continues: "For those who may have difficulty accepting your conclusion and/or what my experiences have shown, let me direct them to a third opinion offered by no less than G5RV himself. In his article 'The G5RV Multiband Antenna . . . Up-to-Date,' which appears in the ARRL *Antenna Compendium*, Louis Varney advises:

"'By far the most efficient feeder is the openwire type. A suitable length of such can be constructed in the same manner as that for the openwire matching section. If this form is employed, almost any length may be used from the center of the antenna to the matching network (balanced) output terminals. In this case, the matching section becomes an integral part of the feeder.'"

Fred indicates that "This article is the most recent word on the G5RV and updates and expands on points made in his original piece on the antenna. It is worth reading, regardless of what type feeder one uses, although there is no escaping his bottom line.

"For those looking for a source of the balanced feedline, three leap to mind immediately: Austin Amateur Radio Supply [5325 North I-35, Austin, TX 78723], RadioKit [P.O. Box 973, Pelham, NH 03076], and Kilo-Tec [P.O. Box 1001, Oak View, CA 93022]. The first is good



If you're going to feed a G5RV (or other similar multiband HF antenna) with openwire line, 450 ohm ladderline, or twinlead, you'll need an antenna tuner or transmatch in almost all cases.

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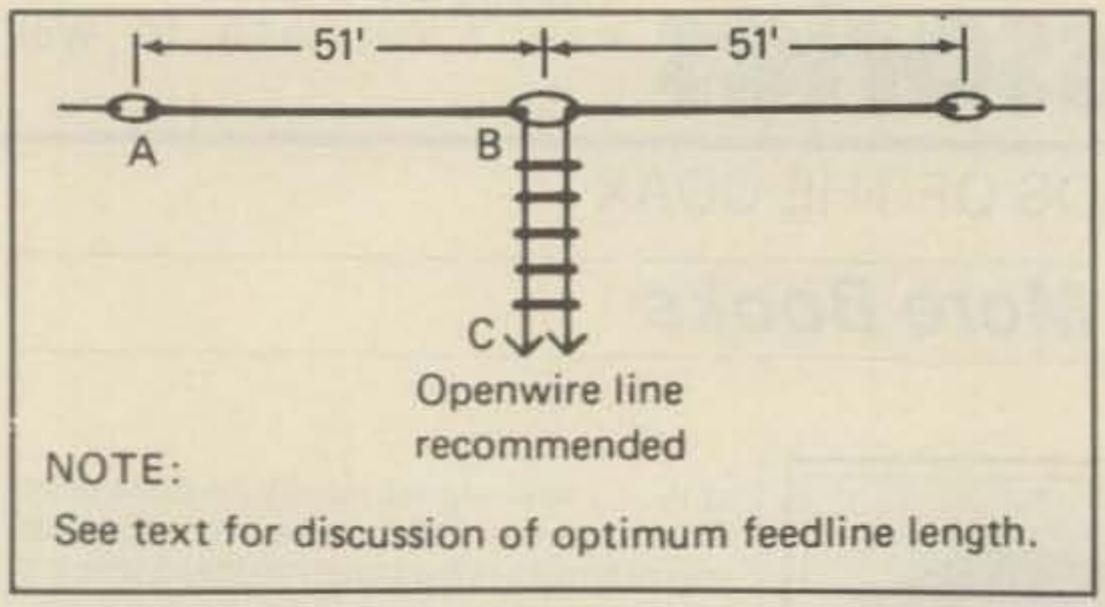


Fig. 1– The G5RV antenna as it is typically constructed. This version, the one I'm partial to, uses 33 feet of openwire line (or about 29 feet of twinlead) connected directly to a transmatch, though these lengths generally aren't critical and may be extended. A second version uses the same 102 foot flattop and 33 or 29 foot length of balanced transmission line connected in turn to a length of coax routed into the hamshack. The latter version sometimes causes matching and loading problems, especially if a balun transformer is used at the intersection of the openwire line and the coax. (CQ Antennas & Accessories column, October 1985 and July 1986.)

Some folks favor the G5RV design that uses coaxial cable for the final run into the hamshack, mainly for the convenience that coax offers. Often a balun is used at the junction of the openwire line or twinlead, and the coax. This often produces losses and can in some cases physically damage the balun, especially if it is of the usual ferrite-core type. If you do want to go the balun route, it's best to experiment with a non-ferrite core design such as one of the W2DU very high power "Maxi-Baluns." (These are available from the Unadilla/Reyco/Inline Division of Antenna's Etc., P.O. Box 215BV, Andover, MA 01810-0814.)

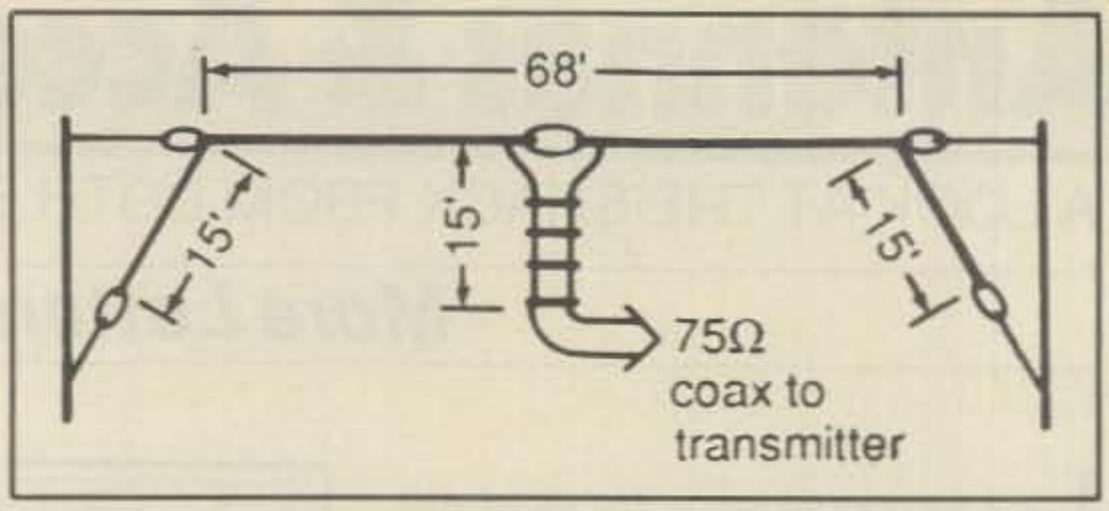
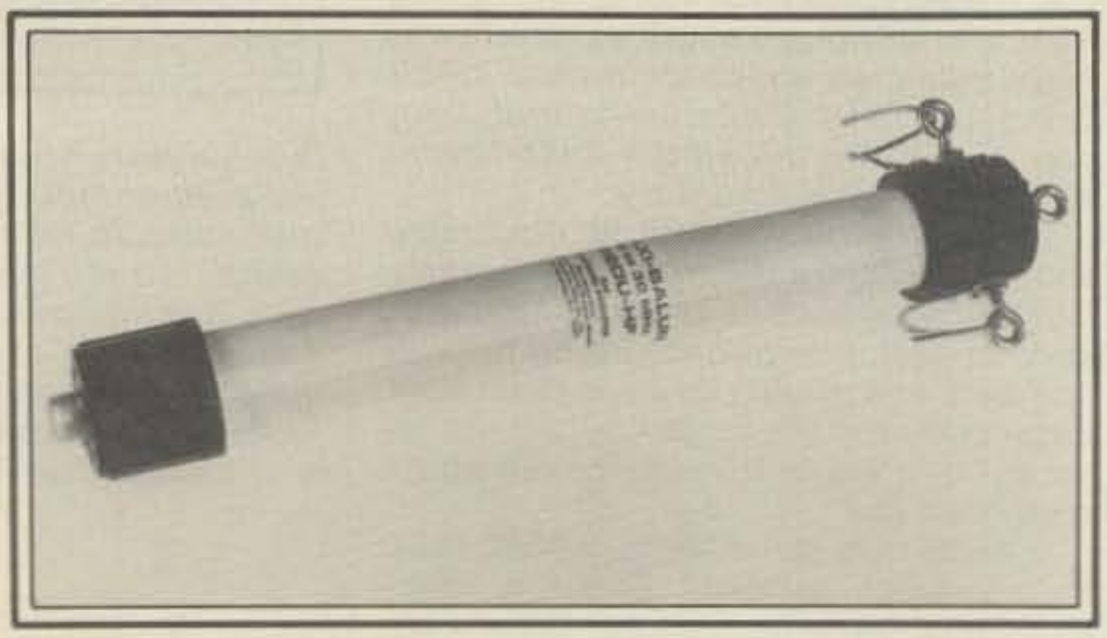


Fig. 2– The so-called hybridized G5RV is a shortened version of its bigger brother, with a bent 98 foot flattop, and is popular in England. G3OJV found this shorter version better for his small yard and described the antenna in the April 1972 issue of Radio Communication. (CQ Antennas & Accessories column, April 1987)



for ladderline, while the second and third have openwire line. Another word of caution: while it will work, 300 ohm TV-type twinlead should be avoided for permanent installations; it will change impedance when it gets wet. Stick with 450 ohm line for best results."

Thanks for the good words, Fred. We'd like to add to your source list two firms that come to mind: Certified Communications, Pittman Road, Route 2, Landrum, SC 29356; and The Radio Works, Box 6159, Portsmouth, VA 23703.

For those readers who aren't familiar with the G5RV, fig. 1 shows the basic 102 foot flattop design, while fig. 2 shows the space-constrained version popularized by G3OJV.

Propagation Notes de NM7M. Robert R. Brown, NM7M, writes the Propagation and DX columns for the *QRP Quarterly*. Bob wrote us last year with some strong views on computer propagation prediction routines, and he expressed some concern about the "blind acceptance" of the basic MINIMUF propagation program when there were, in his view, better MUF programs available.

At the time he wrote, he had in mind MICROMUF 2+ and MAXIMUF, available through the efforts of Raymond Fricker of the BBC External Services. Bob even provided copies of those programs to Shel Shallon, W6EL, who after thorough testing replaced MINIMUF with MAXIMUF in his very popular MINIPROP propagation prediction program.

Writes Bob in an update: "More recently, the NOAA-SESC bulletin board system in Boulder began offering MUF calculations using the older MINIMUF program. I wrote the SYSOP [system operator] and suggested that he consider some of Fricker's programs, even comparing them to the results of NOAA's mainframe program, IONCAP. The SYSOP did that and . . . announced that the various Fricker programs were superior to both MINIMUF 3.5 and MINIMUF-85. Indeed, he is now in the process of replacing MINIMUF with one of the latter programs."

"It occurred to me that I might help the broader understanding of propagation by putting together a booklet, using simple modules to show how propagation programs are assembled . . . One of the things I wanted to get across was that MUF predictions, by themselves, are just not enough. For a path, one needs signal strength information as well for their proper interpretation."

"On one hand, the diagram on page 25 of the *Tool Kit* [Bob's booklet, *The QRPer's BASIC Propagation Tool Kit*, where on page 25 is shown combined MUF and signal strength results over a given path] illustrates the point I am trying to make. But on the other hand, hams should know this from their own personal experience, [with] bands like 40 meters only showing DX openings for limited periods of time in spite of the fact that MUF predictions suggest openings to a DX location for a good part of the day. The difference, of course, is the fact that MUF programs do not take into account the absorption of signals in the D-region. So in the *Tool Kit*, I show how to assemble not only a simple MUF program but also one giving signal strength.

"These modules are simple and while valid, they can be improved on. Thus, while the MINI-F2 algorithm gives a delightful, short F-layer module for the *Tool Kit*, one might want to upgrade the program and use one of the bigger and better MUF algorithms like MICROMUF 2+ and MAXIMUF . . . they are now in the public domain, having been published many times, and hams can pick them up on various BBS [systems] around the country."

"Beyond that, I am now in the process of writing a sequel to the *Tool Kit*, giving a discussion and BASIC modules for about ten different advanced topics. These include such things as long path, slant range, focusing gain, transmitter/receiver antenna gains and patterns, and reflecting surfaces and losses as well as E-layer cutoffs. In short, once the reader is ready to advance beyond the level of the *Tool Kit*, he or she will have the bits and pieces to make a serious, sophisticated homebrew propagation program. I like to think that is better for them, personally, and ham radio in general, than just having them plunk down their money for a disk where everything is hidden behind compiled programs in machine language."

Bob advises that the *Tool Kit* is available for $6.50 postpaid in the U. S. and $7.50 postpaid overseas. It is offered by the QRP ARCI and can be obtained through the QRP ARCI Candy Store, run by Bob Spidell, W6SKQ, 45020 N. Camolin Ave., Lancaster, CA 93534.

I'll agree with Bob that *The QRPer's BASIC Propagation Tool Kit* makes an excellent tutorial for those who want to demystify computer-based propagation prediction. Too, the generic BASIC that Bob uses should make the routines easily adaptable to most any personal computer equipped with BASIC.

From the Bookshelf

Communications Receivers. Ray Moore, ex-K1DBR, has amassed a great deal of data on American-made, general-coverage superheterodyne communications receivers built from 1932 to 1981. Ray's 112-page book is chock full of performance features, general commentary, and photos of and about the receiv-

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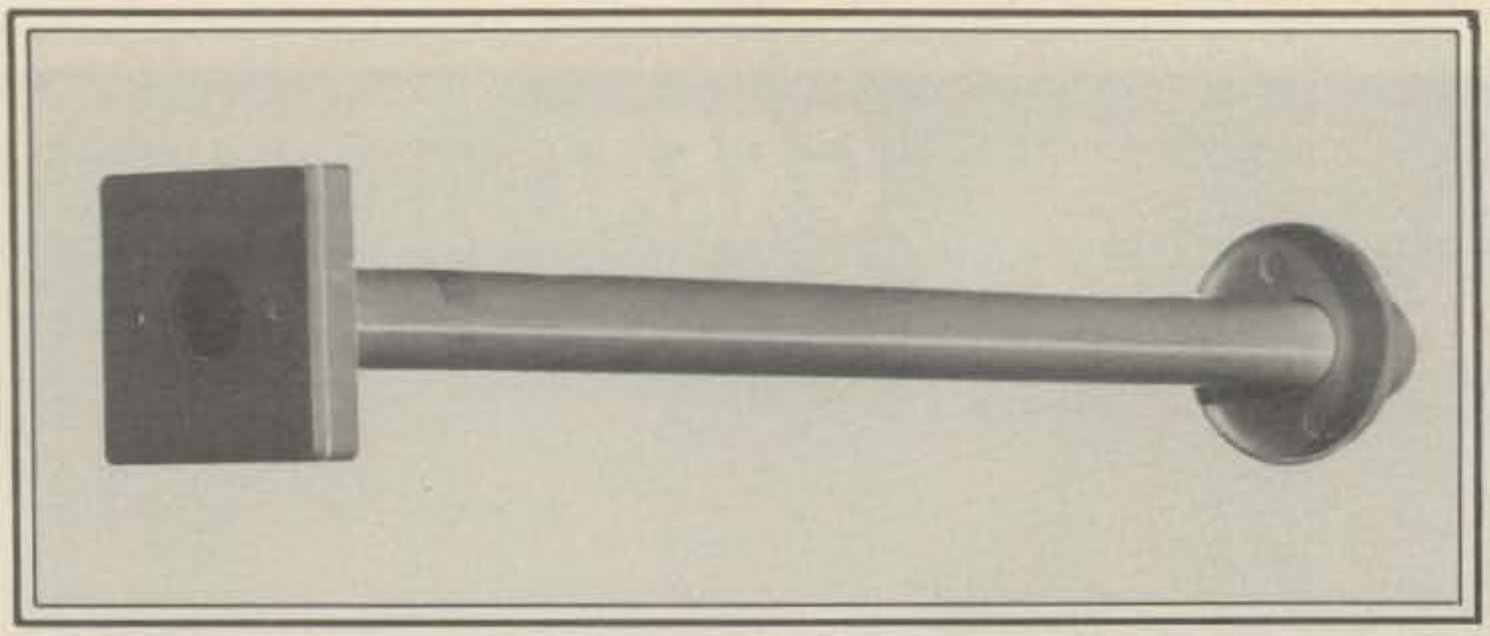

One problem in using parallel feeders with G5RVs and other multiband antennas lies in bringing the feeder into the house. This Radio Shack #15-1200 "Wall-Thru" lead-in tube is designed to bring TV lead-in through a wall. Snaking 450 ohm ladderline line through it is a little tight, but transmitting- type 300 ohm feedline should snake through okay. (The end caps on the newer "Wall-Thru" tubes are somewhat different from those in this photo, but the idea is the same. Photo via Radio Shack.)

ers themselves and the companies that manufactured them. In a letter from Ray, he confesses his love for these sets:

"The book is the result of my lifetime search for the ultimate receiver. I haven't found it yet, but I've had a lot of fun along the way, and have one of the largest collections of material on communications receivers anywhere. In addition, the interest in receivers led me into my vocation, first in the vacuum-tube industry and then in semiconductors. I retired in mid-1985 as Executive Vice President of Teledyne Crystalonics where I was very active in the development of high performance FETs and Varactors for the communications industry.

"The emphasis in this book, as in others I am working on, is substance. I can't compete with *Time-Life* on graphics, but I can fill the book with information and not fluff."

Ray's book isn't fluff. Rather, it's a very complete guide to American receivers. It covers the famous manufacturers, such as R.M.E., National, Hammarlund, Collins, Morrow, and many others—along with fairly obscure companies such as Patterson, Federated Purchaser, and Guthman. It's clearly a work of love from a DXer whose interest in equipment goes well back into the 1930s.

The book is priced at $14.95 plus $2.00 postage and handling, from RSM Communications, P.O. Box 218, Norwood, MA 02062.

Antenna Books from CQ. A few months ago in a conversation with *CQ*'s Associate Editor Pete O'Dell, WB2D, the fact came up that *CQ*'s own Book Shop carries several antenna-related books at reasonable prices. Pete and I decided that it would be a good idea to highlight that fact in an upcoming column.

Actually, the *CQ* Book Shop carries five Radio Publications Group antenna books, better known as the "Bill Orr Series," as well as Bill's *Radio Handbook*. The Book Shop also stocks Paul Lee's classic *Vertical Antenna Handbook*, and Jacobs and Cohen's *The Shortwave Propagation Handbook*. While many of these titles are familiar to *CQ* readers, several may not be, so we'll briefly run over each one of them here.

The books in Bill Orr, W6SAI's series, which he co-authors with Stu Cowan, W2LX, are classics. These easy-reading tutorials deserve a place on the bookshelf of any active amateur, especially one who actively dabbles in antennas. Each title is loaded with practical how-to-do-it information, with tables, charts, and formulas arranged for handy reference. (Bill was *CQ*'s Antennas Editor before we took over the helm from him in 1980.)

One of the most popular books in the series is the *Beam Antenna Handbook*, which includes the latest in state-of-the-art beam antenna design information, including beam dimensions for the new WARC bands. Some of the topics covered include feedlines, baluns, matching systems, beam height, and more. This softcover book is priced at $9.95.

Simple, Low-Cost Wire Antennas provides most of what you need to know about building no-frills, economical wire antennas. A practical book, *Wire Antennas* includes a special section on "invisible" antennas just right for apartment and condo dwellers. The 192-page paperback is $7.95.

All About Cubical Quad Antennas is a 112-page handbook on Quad theory, design, construction, and operation. Included is information on how to build and adjust various types of Quads, including mini-Quads, monster Quads, and the Expanded (X-Q) high-gain Quad. The book contains a wealth of useful information on construction, feeding, tuning, and mounting these high- performance antennas. It's priced at $7.95 also.

All About Vertical Antennas thoroughly covers vertical theory, design, construction, and operation in a clear and concise text. Some of the topics covered include comparisons between horizontal and vertical antennas, Marconi antennas for 160 meters, the effects of grounding systems on vertical antenna performance, and matching circuits of various types. The 192-page text is $10.95.

The last in the antenna book series is *The Radio Amateur Antenna Handbook*, which contains a wide assortment of construction projects for longwire, vertical, and HF/VHF beam antennas. Included are comparisons between the Yagi and Quad, and information on baluns, slopers, and delta loops. It's $9.95.

Not an antenna book, strictly speaking, but there's a good deal of antenna material in Bill's massive (1168-page) *Radio Handbook*, which comes close to being a single-source reference on radio communications and theory for amateurs, engineers, and technicians. New coverage in this hands-on instruction manual includes solid-state devices, Yagis and Quads, and HF amplifier designs. It's a hardcover priced at $29.95.

Long out of print, Capt. Paul H. Lee, N6PL's *Vertical Antenna Handbook* has been reprinted, updated, and edited in collaboration with *CQ*'s own editor, Alan Dorhoffer, K2EEK. Based on the author's many years of naval and commercial communications experience with a wide variety of vertical antenna designs, the book contains lots of practical construction projects. Included are designs for simple, quarter-wave antennas as well as multi-element directional verticals and antennas for 160 meters. Other sections include feeding and matching, short verticals, ground effects, and more. The 139-page paperback is $9.95.

Last, but certainly not least, on our list is *The Shortwave Propagation Handbook*, by noted propagation authorities George Jacobs, W3ASK, and Theodore J. (Ted) Cohen, N4XX. In it the authors explore exactly how radio signals between 3 and 300 MHz are propagated under the influence of sunspots, the ionosphere, auroral ionization, meteor trails, sporadic-E, scatter phenomena, and other factors. Through interesting and fascinating text, which is amply supplemented by charts, photos, and illustrations, you're told what you need to know to take fullest advantage of your communications equipment. The 150-page softcover book is well-suited for amateurs and SWLs alike and is priced at $8.95.

Check the *CQ* Book Shop ad that appears in each issue if you're interested in obtaining any of these titles.

Software Notes

Terminator. *Terminator* bills itself as "the world clock on your PC," and it emulates the fascinating but pricey GeoChron™ clocks often seen in international hotel lobbies and in the studies of the very wealthy. The program, which can be used in either a stand-alone or a memory-resident background mode, presents a very precise map of the world showing the location and time in any of 24 locations you choose. It clearly displays the terminator, the line between light and dark, in real time.

The program allows you to customize the display, entering the name, latitude, longitude, and time zone of any location you desire to be displayed. No toy, the time algorithms used are quite precise, and they consider the declination angle of the sun, the apparent size of the solar disk, the refraction of the earth's atmosphere, and the difference between solar time and earth time caused by the slightly elliptical orbit of the earth. This last effect can be seen by the motion of the sun locator spot on the map, easily visible in the week-at-a-time high speed mode as a skinny figure-eight traced by the sun position.

Designed for the IBM-PC, *Terminator* is aimed at the businessman, traveler, and amateur radio operator. Used in memory resident mode, I can see it being put to good use as an educational "pop-up" tool in conjunction with a propagation prediction program operating in the foreground. I've loaded it behind BandAid and MufMap (from Base 2 Systems), and it seems to work well with them.

Terminator is $39.95 from Spite Software, 4004 S. W. Barbur Blvd., Portland, OR 97201.

SquareNote Update. In last November's issue we reviewed *SquareNote*, "The Idea Librarian," a free-form IBM-PC database that lets you write, edit, store, retrieve, and maintain notes

in much the same way as you would a deck of 3 × 5 index cards. As we mentioned then, we've found the program to be excellent for tracking subjects in our monthly column. Using SquareNote, when a reader inquires about a particular subject, we can search for and instantly locate all issues in which we covered the subject. We also use it to search by subject to respond to folks who can't remember the exact issue in which a particular subject appeared. We reviewed an early version in our column, and were therefore pleasantly surprised to learn of version 2.0's hitting the market. The enhanced version is much faster (with a built-in RAM cache to minimize disk access), has smarter data import and export features and global text search, and sports a new text editor, to name but a few improved features. It's a program to consider if, for example, you want a practical method of cataloging construction or other magazine articles you've saved in a way that you can actually *find* an article later. It's $99 from UnionSquareware, P.O. Box 228, Somerville, MA 02143.

PC Tools Deluxe. Several months ago we ran a multiple-part series highlighting some of the best IBM-PC utilities. We mentioned that one of the most capable and cost-effective utility packages on the market was *PC Tools* from Central Point Software. This top-performing toolkit offered a variety of most-needed utility routines in a slick $39.95 package.

Not long after we completed our review, the firm replaced it with a follow-on product, *PC Tools Deluxe* (it always seems to happen this way when you review software!). At $79 the new product is a good deal more expensive than its predecessor, so it's no longer such an out-and-out steal. But this is more than made up for by the refinement of many of its capabilities and the addition of several powerful new features.

The upgrade offers a background DOS shell, a complete set of advanced DOS utilities, fast hard-disk backup and restore programs, disk unformatting, disk compression (optimization), a disk caching program to speed up disk access, a system for positively tracking and safely recovering erased programs and files, and a "lifesaving" rebuild feature that can even let you recover in-place from an accidental format of your hard disk.

Central Point also has improved on the documentation: a thick 163-page user's manual is included, which replaces the rather skimpy 75 pages of instructions for the original *PC Tools*.

This upgrade is definitely a case of "the best getting better;" it's my all-around IBM-PC utility of choice. My only regret is the doubling of price, though the package is still much less expensive than anything comparable offered by its competitors. Too, it's widely available at a discount, and future updates are only $15. For details contact Central Point Software, Inc., 9700 S. W. Capitol Hwy. #100, Portland, OR 97219.

Disk Jockey. No rock-n-roll here, *Disk Jockey* is a collection of ten near-indispensable utilities and commands for DOS on the IBM-PC. It's by Revolution Software, the same folks who produce *Cruise Control*, one of the utilities we reviewed in our multi-part series covering some of the best IBM-PC utility programs.

Disk Jockey isn't a single program, but is rather ten completely separate utility programs on a single disk. The ten utilities are organized into four groups according to the type of function they provide. These are the Disk Maintenance, Data Security, File Management, and Printer Management Groups.

The Disk Maintenance Group includes two programs, REORG, a file reorganization or compression utility, is especially useful to hard-disk users to reduce the scattering of files into separate parts, which can lead to significant performance (speed) deterioration on hard disks. DISKTEST gives you a "heads up" on the status of either a floppy or hard disk by testing the current status of the disk, reporting on unreadable disk areas, and allowing you to mark those bad areas so that DOS will not later try to use them.

The Data Security Group includes two programs, ENCRYPT and PROTECT. The first program allows you to encrypt files should you want to protect them from prying eyes; according to the user's manual, the utility uses the National Bureau of Standards' "Data Encryption Algorithm" in tandem with a password you select. The second program allows you to mark files as "read only" so that someone can't change or erase them (accidentally or intentionally). It also lets you hide files so that they will not appear in an ordinary directory listing.

The File Management Group is the heart of the package, and it contains four highly useful programs. SEARCH allows you to find and list files that contain certain words or phrases (great for searching contest-log and wordprocessing files). FINDFILE allows you to search an entire hard disk to find on which directory a long-forgotten file resides; the program gives you a listing of each directory (it could be more than one) which holds the file you're looking for. FINDDUPE is a variation on the FINDFILE utility which lets you "clean up" your disk. It does this by presenting you with a listing of duplicate copies of the same file found in different directories. With that information you can easily erase the dupes and free up additional room on your disk. DIRSORT allows flexibility in displaying directory information by providing you with a directory listing that is sorted by up to four different "fields" (filename, filename extension, and date).

The Printer Management Group contains two files, SETPRINT and REDIRECT. SETPRINT helps in simplifying the sending of control codes to your printer when you want it to do "fancy things" like underlining, boldfacing, changing font type, and the like; it allows you to define your own standard set of printer control codes using simple names or characters you can easily remember. REDIRECT is a handy utility that is used to intercept and reroute output that an application program is sending to your printer. This lets you redirect that output to a disk file, or even to a different printer, by tricking the application program into thinking that it is printing its output as usual.

Disk Jockey requires an IBM-PC, PC-XT, PC-AT, PS/2 or 100% compatible computer, 256K RAM, and PC-DOS version 2.0 or later. The package is provided both with 5.25 and 3.5 inch disks and is not copy-protected. For information, contact Revolution Software, Inc., 71 Route 10 East, Randolph, NJ 07869.

Short Bursts

While we're discussing computer software, it's a good time to highlight a very small point: Do you regularly save your data as you go in a computer session, or do you wait until it's time to shut things down before saving your data? Worse yet, do you ever just *forget* to save your work before powering down?

There is little that is more stomach-upsetting than losing a three-hour contest log, a thousand words of hard-processed text, or the latest changes to the radio club's membership roster through a brief power blip or a quick memory lapse. But there are a few precautions you can take to guard against such disasters.

For example, save your work frequently as you go along; certainly don't wait until you're finished to save it. Save every full screen of data, or every ten minutes, or whatever is convenient to you. And, if you're going to be away from your PC, even if it's only for a few minutes, be *sure* to store the file on which you're currently working. Really important work should also be backed up to a second disk.

Some application programs (though few, if any, amateur software packages) have automatic-save features that force a "save" at preselected intervals so you don't even have to think about saving data. Reportedly, there are some commercial and public-domain utility add-on packages for the IBM-PC that let you force your existing software to automatically save your work.

All this is basic stuff, I know. But lose some irreplaceable data, and the basics suddenly become important again!

73, Karl, W8FX

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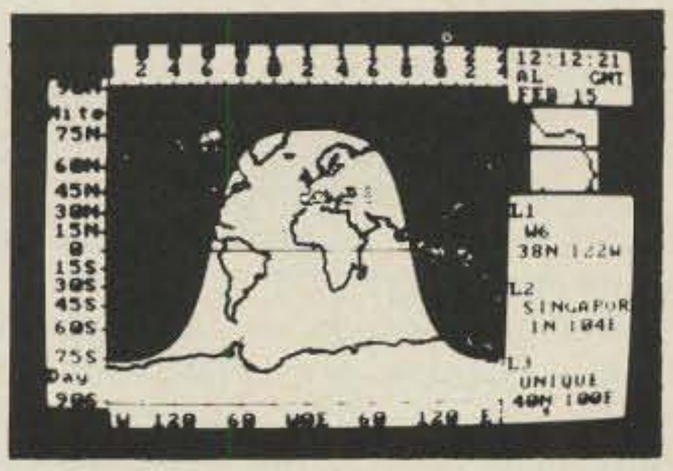

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Please send all reader inquiries directly.

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

We finally received the Scandinavian Activity Contest announcement. The rules as they appeared in last month's column are okay. As promised, here is where to send your logs for this year's SAC. They go to: SSA Contest Manager, Jan Eric Rehn, SM3CER, Lisastaet 18 86300, Sundsbruk, Sweden. The results of the 1987 contest in this issue were provided by Erkki Korhonen, OH4NRC, of the SRAL (Finland), last year's manager, and he included this year's announcement.

The many DX bulletins have already indicated many of the contest expeditions expected for the coming *CQ* World-Wide Contest. Here are a couple I received which will also be forwarded to the bulletins.

A full-bore multi-operator, single transmitter expedition to the Canary Islands is planned by a group of OHs for the Phone WW this month. The call sign will be EA8AGD. In the WW CW test next month OH8PF is planning a single operator, all band operation. Look for the usual operation before and after the contest periods for both of the above.

Look for another expedition, this one out in the Pacific. JE1CKA will be on from Saipan as KHØ/JE1CKA, or maybe Tack will use his stateside call, N1BTP/KHØ, if his application for a KHØ call does not come through in time.

There surely will be many more who will be reported in the bulletins, some with special calls that are usually difficult to identify as country multipliers. Calls with special prefixes may be an advantage in the WPX Contest, but they are not in the World-Wide Contest.

Last year's VK/ZL/Oceania Contest ran into poor conditions again, and stateside activity was very low. The following North American stations were the only ones listed in the results: on CW, KF1Z 1674 points, N6ADI 1102, W8UVZ 850, and NL7DU 140. On SSB, K6SVL 4450, and VE3BXY 2. KF1Z and K6SVL were certificate winners. The fellows "Down Under" are hoping for better conditions this year.

The usual reminder: Deadline for materials for the January issue is October 15th, and November 15th for the February issue. Send information to my home address, please.

73 for this time, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

*	Oct.	1	AGCW-DL Straight Key Party
*	Oct.	1-2	Fernand Raoult F9AA Cup
*	Oct.	1-2	California QSO Party
*	Oct.	1-2	VK/ZL Oceania SSB Contest
*	Oct.	8-9	VK/ZL Oceania CW Contest
†	Oct.	8-9	Iberoamericano Contest
	Oct.	8-9	IRSA Radiosporting Contest
	Oct.	8-9	Pennsylvania QSO Party
	Oct.	8-9	ARCI QRP Fall CW Party
	Oct.	9	RSGB 21/28 MHz Phone
	Oct.	9-10	Illinois QSO Party
	Oct.	12-14	YLRL Anniv. CW QSO Party
	Oct.	14-15	Columbus Day Contest
	Oct.	15-16	Boy Scout Jamboree
	Oct.	15-17	Rhode Island QSO Party
	Oct.	16	RSGB 21 MHz CW Contest
	Oct.	26-28	YLRL Anniv. SSB QSO Party
	Oct.	**29-30**	**CQ WW DX SSB Contest**
	Nov.	5-7	ARRL CW Sweepstakes
	Nov.	11-13	Japan Int. Contest
	Nov	12	ALARA (VKYL) Contest
	Nov.	12-13	European RTTY Contest
	Nov.	12-13	Oklahoma QSO Party
	Nov.	19-21	ARRL Phone Sweepstakes
	Nov.	**26-27**	**CQ WW DX CW Contest**
	Dec.	2-4	ARRL 160 Meter Contest
	Dec.	10-11	ARRL 10 Meter Contest
	Dec.	11	ARCI QRP CW Sprint

** Covered last month.*
† Not official.

ARCI QRP Fall CW Contest

1200Z Sat. to 2400Z Sun., Oct. 8–9

This is the fall edition of the QRP Amateur Radio Club International. This year's activity will be found on CW only. Participants are limited to 24 hours out of the 36-hour contest period.

Exchange: RST and state, province, or country. Members will include their number; non-members their power output.

Scoring: Contacts with members, 5 points. Non-members, 2 points if in same continent, 4 points if in a different continent. The same station may be worked on each band for QSO and multiplier credit.

There is a power output bonus: 0 to 1 watt—× 10; 1 to 5 watts—× 7. Over 5 watts check log only.

The following bonus multipliers are also available: solar or wind power—×2; battery power—×1.5. Must be used for duration of contest. And a new bonus on each band if homebrew equipment is used, 2000 if a transmitter, 3000 if a receiver, and 5000 if a transceiver (maximum of 5000 per band).

Multiplier: Each state, VE province, and DX country worked on each band.

Final Score: Total QSO points from all bands × (states + provinces + countries) × power bonus × power type if any + homebrew bonus.

Frequencies: 1810, 3560, 7040, 14060, 21060, 28060, 50060. Novice—3710, 7110, 21110, 28110.

Awards: Entries may be single or all band. Certificates to the top ten scores overall; to the top score on each band for single band entries; and to the top scores in each state, province, and DX country. There is a team category, 2 to 5 members, with a certificate to the highest scoring team.

Use a separate log sheet for each band. Include a summary sheet showing the scoring, equipment description, and other essential information. Include a large SASE for a copy of the results. It is suggested you send a large SASE to K5VOL for official log forms.

Logs must be received by November 9th and go to: QRP ARCI Manager, Red Reynolds, K5VOL, 835 Surryse Road, Lake Zurich, IL 60047.

Pennsylvania QSO Party

1600–0500Z Sat.–Sun., Oct. 8–9
1300–2200Z Sun., Oct. 9

This is the 31st annual party sponsored by the Nittany ARC of State College, PA. The same station may be worked on each band and mode for QSO points. PA stations may also work other in-state stations for QSO and multiplier credit, and mobiles in each county change. Novice stations must identify.

Exchange: QSO number and QTH. County for PA, ARRL section for others.

Scoring: One point for SSB contacts, 1.5 points for CW, 2 points if on 80 or 160.

PA stations multiply total by (ARRL sections + PA counties + 1 DX country), total of 143 possible. (Remember West Texas is a new county.) Others use PA counties for their multiplier (total of 67 possible).

Mobiles add 500 points for each county operated from with a minimum of 10 QSOs. Mobiles on a county line give one QSO number, but get credit for two multipliers.

QRP stations multiply their score by 2, Novice/Tech by 3.

Frequencies: CW—1810 and 40 kHz up from bottom of each CW band. SSB—1850, 3980, 7280, 14280, 21380, 28580. Novice—10 kHz up from bottom of each Novice band and SSB on 10 meters. Mo-

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1987 SAC Contest Results
North America—Single Operator

CW USA		CW Costa Rica	
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KA1DWX	8,904		
W1LQQ	3,108	**Dom. Rep.**	
W1OPJ	493	HI8LC	1,250
KW1K	180		
K2SC	23,147	**SSB USA**	
WA2SON	4,500		
WA2UDT	3,108	NR2H	1,674
AA2Z	1,050	W3ARK	1,484
K3IPK	23,123	W4WIJ	962
W3ARK	9,686	WK4F	644
N3BNA	5,289	AA4GA	156
WX4G	55,125	W6EUF	1,680
NU4B	989	W7QK	221
K5NA	50,400	W8BCL	2,590
KG5U	1,798	W8RHY	875
W5EIJ	80	W8DWP	475
W6EUF	6,030	W9SS	2,376
N6JV	4,680	WD9INF	396
W6/OH2BAD	54	KBØC/9	323
KA7T	3,816	WØRXL	1,550
K8MFO	38,088		
W8IQ	4,318	**Canada**	
W9AG	3,204	VO1SA	17,464
WØWUU	204		
		Costa Rica	
Alaska		TE2B	651
NL7DU	936		
Canada			
VO1SA	57,225		
VO1AW	17,784		
VE1ACK	117		

VO1SA was the North American plaque winner on CW and SSB. There were no N.A. multi-op entries.

bile—5 kHz below listed frequencies. Try 160 at 0300Z.

Awards: In five classes—single operator, multi-single, multi-multi, mobile, and QRP (5 watt maximum). Certificates to winners in each PA county, ARRL section, DX country, and club (minimum of 3 members and 20 QSOs). Plaques to top scorers in both eastern and western PA, out-of-state, multi-single, mobile, western, and central USA and QRP (*quite a selection—ed.).*

Include a summary sheet with your entry showing the scoring, a check list of counties and sections worked, and a dupe sheet if you make 100 or more contacts. There is a severe penalty of 100 points deducted for each dupe that has not been removed.

Official log forms are recommended, and samples are available from K3CM. Send 50¢ for a copy of the results (no SASE).

Mailing deadline for all entries is November 15th to: Chuck McMullen, K3CM, 7 Holly Circle, State College, PA 16801.

IRSA World Radio Championship

Phone: Oct. 8 CW: Oct. 9
0000Z to 2400Z, Sat. & Sun.

This is the third time around for the International Radiosport Association's championship contest again scheduled in a very saturated weekend of contest activity in October.

It's a worldwide-type contest with a wide assortment of multipliers. Phone and CW are separate contests on different days. Scores, however, can be combined for special awards in certain categories.

Single operator stations are limited to 22 hours out of the 24-hour contest period. The 2-hour off period may be taken in one or two periods. Multi-stations can operate the full 24 hours.

Use all six bands, 1.8–28 MHz (no WARC bands).

Classes: High power, 1000 watts. Low power, 100 watts. And QRP, 5 watts. Single operator, single and all band. Multi-operator, single and multi-transmitter. Club competition and SWL.

Exchange: RS(T) and a progressive QSO number starting with 001.

Points: Two for each completed contact in the phone contest. Three if it's in the CW contest.

Multiplier: Each DXCC country and call areas in the following countries worked on each band: USA, Canada, Australia, Brazil, Japan, USSR Europe, and Asia. Also one for each of the land, maritime, aeronautical mobile groups. Stations operating out of their call area must identify area of operation (i.e., VE3BMV/W2).

Final Score: Total QSO points from all bands times the total multiplier from all bands.

Awards: Certificates to winners in each category and power group, in every participating country, call areas, and mobile group. The station having the highest combined score from each country will receive a free one-year subscription to *Radiosporting* magazine. There are also a dozen championship plaques in several categories for both phone and CW winners.

Log Instructions: Phone and CW are separate contests and require separate logs. Indicate the multiplier only the first time it is worked on each band. Do *not* use a separate sheet for each band, except for multi-operator multi-transmitter stations, who should keep separate logs and QSO numbering for each band. Logs must be checked for duplicate contacts and multipliers, and off periods clearly marked. Entries with more than 200 contacts must include a QSO dupe sheet.

There are many detailed operating instructions for the different classes. I strongly recommend that you send a large SAE and one "green stamp" or 3 IRCs for a sample contest-form kit (*Radiosporting*, P.O. Box 282, Pine Brook, NJ 07058).

You are encouraged to submit your log regardless of your score; they are useful for checking purposes. A one-year subscription to *Radiosporting* will be awarded to the 10 stations selected by a drawing from the logs received.

Logs must be received by December 31st by the Contest Chairman, Walt McGugan, W3FG, P.O. Box 7, Odenton, MD 21113-0007 USA.

Iberoamericano Contest

2000Z Sat. to 2000Z Sun., Oct. 8–9

Organized by "Seccion Territorial de URE del Valles Oriental" and by "CQ Radio Amateur de Boixareu Editores," this contest will be sponsored every year the weekend before October 12th to commemorate the anniversary of the discovery of America. This is a phone-only contest with the emphasis on Latin-American areas.

Classes: Single operator and multi-operator, single transmitter; both Latin-American and non Latin-American. Single operator EC (EA novice), and QRP, less than 5 watts output.

Exchange: RS plus a progressive QSO number (001, etc.).

Bands: All six bands, 1.8 through 28 MHz.

Points: Latin-American stations score one point per QSO. Non-Latin-Americans, 3 points per QSO with Latin-Americans, 1 point with other non-Latin-Americans.

Multiplier: Latin-Americans use the DXCC list. Non-Latin-Americans use the following L-M country list: CE, CO, CP, CR, CT, CX, C3, C9, DU, EA, HC, HI, HK, HP, HR, HT, KP4, LU, OA, PY, TG, TI, XE, YS, YV, ZP, 3C, and dependencies.

Final Score: Total QSO points from all bands times the sum of multipliers from all bands.

At the 1988 DX Convention at Visalia, Martti Laine, OH2BH, tells us what to expect from the Lynx DX Group (Juan, EA9IE, on the right) trip to North Yemen (unannounced at this time of this writing).

SWL: Same rules apply to SWL entries. The same station cannot be logged more than 15% of the total logged. And the same station can only be logged again after 5 other entries.

Penalties: Taking credit for excessive duplicate contacts, and violation of rules and amateur radio regulations could result in disqualification.

Awards: Certificates will be issued to the highest scores in each DXCC country. Participating certificates will go to non-Latin-American stations making 50 or more QSOs. There are plaques for overall winning scores showing at least 4 hours of operation and 100 or more QSOs.

Mailing deadline for entries is November 30th to: X-Concurso Iberoamericano, Gran Via de les Corts Catalanes, 594, 08007 Barcelona, Spain.

RSGB 21/28 MHz SSB Contest

0700 to 1900 GMT Sunday, Oct. 9

It's the world working the British Isles on 21 and 28 MHz.

The same station may be worked on each band for QSO and multiplier credit. There are a total of 49 prefixes available on each band. Following are the rules for areas other than the British Isles.

QSY Rule: All stations who QSY from one band to the other and make a scoring contact may not change bands again for a period of at least 10 minutes after the last contact on the original band (this does not apply to SWLs).

Sections: Single operator and multi-operator, both bands only, and SWL.

Exchange: RS report plus a progressive QSO number starting with 001.

Scoring: Each contact with a B.I. station is worth 3 points. Multiply total QSO points from each band by the sum of B.I. prefixes worked on each band (maximum of 49 per band). The GB prefix does not count for QSO or multiplier.

Unmarked duplicate contacts will be penalized 10 times the points claimed. Logs containing more than 5 unmarked duplicates will be disqualified.

Awards: Certificates to the three leading overall winners, and at the discretion of the committee, to the leading station in each country. Both for transmitting and SWL.

There is also an SWL section. Only B.I. stations are to be logged. Scoring is the same as indicated above. The same call sign may appear once only in every three contacts, except when the logged station is a new multiplier.

Awards: Overseas stations will be awarded certificates to the leading station in each country and the leading station in the multi-operator section, and to the SWL winner in each country. The first, second, and third overall winners will also receive certificates of merit.

John Attaway, K4IIF, presents the DX Hall of Fame award to John Troster, W6ISQ, at the DX Convention at Visalia earlier this year.

Separate log sheets are required for each band. Include a summary sheet showing the scoring, prefixes worked, and a signed declaration that rules and regulations have been observed.

Logs must be received by December 5th. This year they go to: RSGB Contest Committee, P.O. Box 73, Lichfield, Staffs. WS13 6UJ England.

Illinois QSO Party

1800Z Sun. to 0200Z Mon., Oct. 9–10

This is the 26th anniversary of the Illinois QSO Party sponsored by the Radio Amateur Megacycle Society. It's a shorty, only 8 hours long.

Stations may be worked once per band and mode, and IL stations can contact other in-state stations for QSO and multiplier credit.

Exchange: RS(T) and QTH. County for IL stations; state, VE province, or DX country for others.

Scoring: One point for phone contacts, 2 points if on CW. Illinois stations multiply total QSO points by (states + provinces + IL counties + maximum of 5 countries) worked. Additional DX QSOs count for points but not multiplier.

Others use IL counties for their multiplier (maximum of 102).

Illinois mobiles add 200 points to final score for each county from which 10 or more QSOs were made.

All stations earn an extra multiplier for every eight QSOs made with the same county.

Frequencies: CW—3550, 7050, 14050, and 30 kHz above bottom edge of Novice subbands for CW and 28390 for phone. SSB—3890, 7290, 14290. Other bands may also be used.

Awards: Certificates to the top 10 scoring IL fixed stations, 5 IL mobiles, winners in each state, province, country, and the highest club/team aggregate score. A plaque goes to the top-scoring Illinois station.

Logs: Indicate band and mode, circle each new multiplier, and IL mobiles must indicate each county change. Stations with over 100 QSOs must submit a dupe sheet.

A summary sheet showing the scoring and the usual signed declaration is also requested.

Mailing deadline for logs is November 7th to: RAMS, c/o Joe LeKostaj, WB9GOJ, 9134 Ewing Ave., Evanston, IL 60203.

YLRL Anniversary Party

CW: Oct. 12–14 SSB: Oct. 26–28
1400Z–0200Z, Wed.–Fri.

This is the 49th annual party run by the YL Radio League. It is open to all YL's around the world. Activity will be found on all bands, 10 through 80 meters, and will be between YLs only.

CW and SSB are separate contests and require separate logs. A station may be worked *once on each band* for contest credit. Operation is limited to 24 out of the 36-hour contest period. Be sure to indicate off periods in your log.

Exchange: QSO no., RS(T), and QTH; U.S. state, VE province, or DX country.

Scoring: One point per QSO between stations within the U.S. and Canada (including Alaska and Hawaii). Two points for contacts with stations in other areas.

DX YLs score 2 points for QSOs with the U.S. and Canada and with other continents, but 1 point with stations in own continent.

Final Score: Multiply total QSO points from all bands by the sum of states, provinces, and DX countries worked.

There is a low-power bonus multiplier of 1.25 for stations using 100 watts or less on CW and 200 watts PEP on SSB. Multiply final score by 1.25 if applicable.

For each duplicate contact removed from your log there is a penalty of 3 additional and equal contacts removed from your log.

Frequencies: CW—3555, 7055, 14055, 21135, 28195. SSB—3955, 7255, 14265, 21395, 28595 (plus or minus 15 kHz). Look in DX portions of band on 40 and 80 meters.

Awards: Certificates to winning scores in each district, province, and DX country, and first, second, and third place overall winners. There are cups and plaques for YLRL members in North America and DX countries, and two spe-

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IC-BP20 Battery Case 16.00
IC-BP21 7.2 VDC, 120 mAH., Ni-Cad Batt. Pack. . . 35.99
IC-BP22 8.4 VDC, 270 mAH., Ni-Cad Batt. Pack. . . 39.50
IC-BP23 8.4 VDC, 600 mAH., Ni-Cad Batt. Pack. . . 49.00
IC-BP24 10.8 VDC, 600 mAH., Ni-Cad Batt. Pack . . . 51.50
BC-16U AC Wall Charger For IC-BP7, 8, 23, 24 . . . 21.25
BC-25U AC Wall Charger For IC-BP3, 21, 22 . . . 16.99
BC-35 Drop-In Rapid Charger; IC-BP2, 5, 7, 8 . . . 79.00
BC-50 Drop-In Rapid Charger; IC-BP21, 22, 23, 24. . . 79.00
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LC-11 Leatherette Case, IC-02AT W/IC-BP3. . . 20.50
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cial awards for the highest combined CW and SSB scores.

Include a summary sheet with your entry showing the scoring and other essential information. Logs must be in their original form, no carbon copies.

Your entry must be received by December 2nd, and this year logs go to: Carol Shrader, WI4K, 4744 Thoroughgood Dr., Virginia Beach, VA 23455.

Columbus Day DX Contest

1200Z Sat. to 2400Z Sun., Oct. 14–15

Sponsored by the Miami Havana Lions Club and announced as a contest, this is more of an on-the-air activity commemorating the discovery of America by Columbus.

Activity will be found on all five bands, 10 through 80 meters, both on phone and CW. Packet radio and RTTY can also be used.

Give a signal report and your QTH in the exchange.

The same station can be worked on each band and mode for credit. Make five or more contacts with official radio club member stations and you are eligible to apply for the colorful Miami Havana Lions Club certificate. SWLs can also apply on a heard basis.

At the start of the contest period listen on the following frequencies on SSB: 28450/28915, 21250/21300, 14250/14300, and 7230/7250. Names and numbers of the official club members will be given for identification.

Send your log or QSLs and $3.00 or 6 IRCs for the special award to: Miami Havana Lions Club, Columbus Day Contest, P.O. Box 674, Miami, FL 33135.

Scouts Jamboree On The Air

0001 Sat. to 2400 Sun., Local Time, Oct. 15–16

This is the 31st annual Jamboree sponsored by the World Scout Bureau. This is not a contest, but an opportunity for Scouts or anyone interested in Scouting to get together on the air and exchange greetings and information.

Activity is worldwide, and this year the emphasis is on Australia, where the 17th World Scout Jamboree will be held in two months.

Scouts of course will set up their own stations, but amateurs can invite members of Scout units or individuals to visit their stations or clubs to see how ham radio operates.

Any authorized frequencies may be used. The following frequencies are suggested as calling spots, and once a contact has been established, move to another frequency. CW—3590, 7030, 14070, 21140, 28190 kHz. Phone—3740, 3940, 7090, 14290, 21360, 28990 kHz.

No specific exchange, no scoring, and no logs are required, but participating stations are requested to send a report of their activity to their National Organizer. In the US they can be sent to: JOTA Coordinator, International Division BSA, 1325 Walnut Hill Lane, Irving, TX 75038-3096.

Rhode Island QSO Party

1700Z Sat. to 0500Z Sun., Oct. 15–16
1300Z Sun. to 0100Z Mon., Oct. 16–17

This one is again being sponsored by the East Bay AWA (WA1YPN). The same station maybe worked on each band and each mode. RI stations may contact others RI stations for QSO points.

Exchange: RS(T) and QTH. City or town for RI; state, province, or DX country for others.

Scoring: Phone QSOs are worth 2 points, CW 3 points.

RI stations multiply total QSO points by RI cities/towns, states, VE provinces, and DX countries worked. Others by the different RI cities and towns worked for their final score (39 cities and towns).

Frequencies: CW—1810, 3550, 3710, 7050, 7110, 14050, 21050, 21110, 28050, 28110. Phone—1850, 3900, 7260, 14300, 21360, 28350, 50110, 144.2 and 146.52. (Use of FM simplex is encouraged. No repeaters.)

Awards: Certificates to the top-scoring single operator station in each RI county, and each state, province, and country. The top-scoring Novice/Tech. in RI and out of state will also be rewarded, as will the winning RI multi-operator station.

Include a summary sheet with your entry showing the scoring and other essential information, and an SASE for a copy of the results.

Mailing deadline is November 30th to: East Bay AWA Inc., P.O. Box 392, Warren, RI 02885.

RSGB 21 MHz CW Contest

0700 to 1900 GMT Sunday, Oct. 16

Like the 21/28 MHz Phone Contest, the activity in this one is between the British Isles and the rest of the world. Competition is limited to single operator stations only. There is a separate QRP section in which power input must not exceed 10 watts, and there is also an SWL section.

The following rules are for areas other than the British Isles.

Exchange: RST report plus a progressive QSO number starting with 001.

Scoring: Each contact with a B.I. station is worth three points. Multiply total QSO points by the number of B.I. prefixes worked (G2, G3, GD3, etc.). A maximum of 49 is possible. (GB does not count for QSO or multiplier.)

Unmarked duplicate contacts for which credit has been taken will be penalized ten times the points claimed. Logs containing more than five unmarked duplicates will be disqualified.

Only British Isles stations are to be logged by overseas SWLs. The same call may be reported only once in every three contacts, unless the logged station is a new multiplier. Scoring is the same as above.

Awards: Certificates to the three leading overall winners, and at the discretion of the committee, to the leading station in each country. Both for transmitting and SWL.

Include a summary sheet with a list of prefixes worked, station description, the usual signed declaration, and your name and address in block letters.

Logs must be received by December 31st and they go to: RSGB Contest Committee, P.O. Box 73, Lichfield, Staffs. WS13 6UJ, England.

CQ World-Wide DX Contest

Phone: Oct. 29–30 CW: Nov. 26–27
0000Z Saturday to 2400Z Sunday

Complete rules were published in last month's issue and are the same as those used these many years. There have been a few changes and additions in the sponsors of the more than 65 trophies and plaques that will be awarded in the 1988 contest.

A couple of awards have been deleted or picked up by new donors. Please note the four 7 MHz awards, phone and CW, and the new Canadian Multi-Operator Single-Transmitter CW award. Those trophies identified by an asterisk are provided by the donors and are not the responsibility of CQ.

You are again reminded to study the disqualification clause. Penalties for taking credit for duplicate contacts and other infractions have been clearly defined. You not only risk a deduction in your score, but also possible disqualification, especially if your score was questionable in last year's contest.

There are other areas that might lead to being disqualified—sportsmanship, regulation violations, etc. The Contest Committee is cognizant of the fact and will be watching those areas in this year's contest.

Repeating the deadline, all entries must be postmarked NO LATER than December 1, 1988 for the phone section, and January 15, 1989 for the CW section. An extension may be granted if requested in writing to the Contest Committee.

Again this year all logs must be sent directly to: CQ World-Wide DX Contest, 76 North Broadway, Hicksville, NY 11801 U.S.A. Be sure to indicate Phone or CW on the envelope.

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MA-550	55'	22'1"	3	435	3" sq.	6"	$1369.00
MA-550MDP*	55'	22'1"	3	620	3" sq.	6"	$2909.00
MA-770	71'	22'10"	4	645	3" sq.	8"	$2509.00
MA-770MDP*	71'	22'10"	4	830	3" sq.	8"	$3969.00
MA-850MDP*	85'	23'6"	5	1128	3" sq.	10"	$5349.00

*MDP models complete with heavy-duty motor drive with positive pull down.

FREE STANDING CRANK-UP TOWERS
Will handle 18 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TX-438	38'	21'6"	2	355	12½"	15"	$1019.00
TX-455	55'	22'	3	670	12½"	18"	$1539.00
TX-472	72'	22'8"	4	1040	12½"	21⅝"	$2529.00
TX-472MDP*	72'	22'8"	4	1210	12½"	21⅝"	$4069.00
TX-489	89'	23'4"	5	1590	12½"	25⅝"	$4399.00
TX-489MDPL*	89'	23'4"	5	1800	12½"	25⅝"	$6599.00

*TX-472MDP includes heavy-duty motor drive with positive pull down. TX-489MDPL comes with heavy-duty motor drive with dual level wind and positive pull down. (Both motor drive models include limit switch brackets).

FREE STANDING HEAVY-DUTY CRANK-UP TOWERS.
Will handle 30 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
HDX-538	38'	21'6"	2	600	15"	18"	$1319.00
HDX-555	55'	22'	3	870	15"	21⅝"	$2309.00
HDX-572	72'	22'8"	4	1420	15"	25⅝"	$3959.00
HDX-572MDPL*	72'	22'8"	4	1600	15"	25⅝"	$6049.00
HDX-589MDPL*	89'	23'8"	5	2440	15"	30⅝"	$7919.00

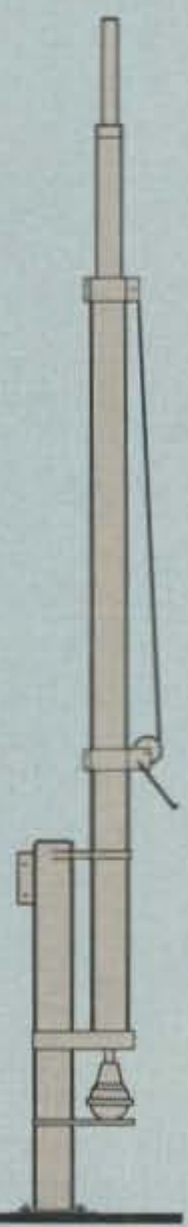
*Includes heavy-duty motor drives with dual level wind and positive pull down. HDX-572MDPL includes limit switch brackets only. HDX-589MDPL includes limit switches and limit switch brackets.

FREE STANDING "LOW PROFILE" COMPACT CRANK-UP TOWERS.
Will handle 18 sq. ft. antennas at 50 MPH winds. (TMM-433HD handles 24 sq. ft.)

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TMM-433SS*	33' w/o mast	11'4"	4	315	10"	18"	$1089.00
TMM-433HD*	33' w/o mast	11'4"	4	400	12½"	20⅞"	$1319.00
TMM-541SS*	41' w/o mast	12'	5	430	10"	20⅞"	$1429.00

*Hy-Gain and some Alliance rotors when installed inside tower will restrict retracted height by approx. 24". Most Kenpro models allow full retraction.

Shown w/optional MARB550 rotorbase and rotator.



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Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

DX Contest Special

It's DX Contest time again! The 1988 *CQ* World-wide DX Contest will be held on the following dates:

Phone: 0000 UTC Saturday, Oct. 29 to 2400 UTC Sunday, Oct. 30
CW: 0000 UTC Saturday, Nov. 26 to 2400 UTC Sunday, Nov. 27

For the 38th consecutive year this month's propagation column is devoted to special forecasts for the contest periods, both phone and CW. The accuracy of the 37 previous contest forecasts is in excess of 90 percent!

Solar Activity

Barring the occurrence of a radio storm, there is good news for the 1988 WW DX Contest period. The new solar cycle is rising rapidly and is expected to exceed a smoothed sunspot count of 100 during October and November, with a good possibility that the count may reach as high as 115 during October and 118 during November. These levels of solar activity would be higher than recorded during any previous contest period since 1981. The 10.7 cm solar flux level is expected to be in the 150 to 160 range.

The Royal Observatory of Belgium reports a monthly mean sunspot number of 101.8 for June 1988. Daily values ranged from a low of 47 on June 13th to a high of 173 on the 9th. This is the highest level of monthly mean solar activity reported since December 1982, as the present cycle continues at a rapid rate. June's solar level results in a 12-month running smoothed number of 51 centered on December 1987. The median value of 10.7 solar flux for June was 139.4, as reported by the Algonquin Radio Observatory at Ottawa, Ontario.

Day-To-Day Forecast

A long-range *CQ* day-to-day forecast based primarily on the 27-day recurrence tendencies of geomagnetic and ionospheric conditions indicates that there is a high probability that conditions during the *CQ* WW DX Phone Contest weekend of October 29–30 will vary between Low Normal and Below Normal. An updated forecast for the contest weekend will be given as a bulletin at the beginning of next month's column. The November issue of *CQ* should reach most subscribers before the phone contest weekend.

See the Last Minute Forecast box in this column for additional information concerning expected day-to-day conditions during October.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for October 1988

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 21, 26	**A**	**A**	**B**	**C**
High Normal: 1, 3-4, 14-15, 22-23, 25	**A**	**B**	**C**	**C-D**
Low Normal: 2, 5-6, 8-10, 16, 19-20, 24, 27-28, 30-31	**B**	**C**	**D**	**D-E**
Below Normal: 7, 11, 13, 17-18, 29	**C**	**C-D**	**D-E**	**E**
Disturbed: 12	**C-D**	**D**	**E**	**E**

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.

E—No opening expected.
3 dB per S-Unit.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**
2. **With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on Oct. 1st, good-to-fair (B-C) on the 2nd, good (B) on the 3rd and 4th, good-to-fair (B-C) on the 5th and 6th, fair-to-poor (C-D) on the 7th, etc. Some radio storminess is possible during the Contest weekend (Oct. 29-30), with conditions expected to vary between Low and Below Normal.**

Band-BY-Band Conditions

It is expected that solar activity will have risen to a level during the 1988 contest period which will permit a significant improvement in band-opening conditions on all the HF amateur bands, 160 through 10 meters! Statistically, the expected smoothed sunspot range of 115–118 is higher than any level recorded since the 1981 contest period. Unless a radio storm should develop to mar conditions, expect conditions, activity, and results during the 1988 contest to be better than those observed over the past seven years.

The following is a band-by-band summary of DX propagation conditions normally expected from mid-October through mid-December 1988 and centered on the contest period. For a more detailed circuit-by-circuit analysis, refer to the DX Propagation Charts appearing on the following pages.

10 meters: Good, solid openings should be possible to just about every corner of the world during the daylight hours, and the band may remain open to southern and tropical areas into the early evening. DX openings should begin an hour or so after sunrise towards Europe, Africa, and the east, as well as in a southerly direction towards the Caribbean and Central and South America. Signals should peak in intensity towards Europe and the east an hour or so before noon, towards Africa about an hour or so after noon, and towards the south during the late afternoon. Optimum conditions towards the Far East, Australasia, Southeast Asia, etc., are forecast for the late afternoon and early evening hours. Exceptionally strong signal levels can be expected on many openings, particularly when conditions rise to High or Above Normal.

15 meters: This band should be jumping during most of the daylight hours. Excellent propagation conditions are expected from shortly after sunrise through the early evening hours. The band could remain open well into the evening towards southern and tropical areas. Peak openings should occur towards a specific geographical area about an hour or so after the peak has occurred to the same area on *10* meters. Openings are expected to all areas of the world, and exceptionally strong signals should be possible most of the time. *Fifteen* meters is likely the *best* DX band during the daytime hours, but at times it will be a toss-up with *10* meters.

20 meters: Expect good-to-excellent DX openings almost around the clock. Signals should peak from all directions for about an hour or two after sunrise and again during the late afternoon and early evening. Excellent openings are expected to many southern and tropical areas well into the hours of darkness, and when conditions are High Normal or better, the band should remain open for DX during most of the night. Expect *long-path* openings on this band for about an hour or so after sunrise and again for an hour or so before local sunset. Signal levels are ex-

Say You Saw It In CQ

pected to be exceptionally strong during peak propagation periods on *20* meters. This should be the band that will produce the longest period for DX openings, the strongest signals, and openings to more areas of the world than any other single band during the contest periods.

40 meters: This should be a prime DX band during the hours of darkness as summer static fades into oblivion. DX openings should begin during later afternoon, continue through the hours of darkness, and last until an hour or two after sunrise. The band should open first for DX towards Europe and the east during the late afternoon. Signals should increase in intensity as darkness approaches. During the hours of darkness expect good DX openings to most areas of the world. Signals should peak from an easterly direction about midnight, and from a westerly direction just after sunrise. Excellent openings towards the south should be possible throughout most of the nighttime period. *Forty* meters is likely to be the best band for DX during the hours of darkness, although at times it may be nip and tuck with *20* meters for this honor.

80 meters: While not quite as good a nighttime band as *40* meters, expect some good DX openings on this band to many areas of the world during the hours of darkness. The band will open later, close earlier, and be somewhat noisier than *40* meters. Signals should peak towards Europe and the east around midnight, and towards the west just before sunrise. Expect good openings towards the south throughout most of the night.

160 meters: Considerably decreased static levels and longer hours of darkness in the Northern Hemisphere should welcome back DX openings in this band during the hours of darkness and into the sunrise period. Because of relatively high signal absorption and the lower power levels used in this band, openings will often be weak and noisy, but some fairly good ones should be possible. Best bets are for openings towards Europe and towards the Caribbean and Latin America from the eastern half of the country, and towards the Far East, Australasia, the South Pacific, and Latin America from the western half of the country. DX openings to other areas of the world may also be possible. The best propagation aid for this band (and for *40* and *80* meters as well) is a set of sunrise and sunset tables, since DX signals tend to peak when it is *local sunrise* at the *easternmost* point of a path.

Contest Work Charts

The DX Propagation Charts on the following pages show the times when each amateur band from *6* through *160* meters is expected to open from each time zone area in the continental USA to the major DX areas in the world. The information contained in the charts, while useful during the contest period in their present format, can easily be reorganized into more convenient formats to meet specific operational work plans or schedules. Experience gained during previous contests has shown that specifically tailored schedules derived from the charts can be extremely useful in piling up contacts and points with a minimum of wasted time.

Table I is an example of one of several types of plans that can be devised. It is a *multi-band* operational work plan, which shows the times and bands when propagation conditions are expected to be optimum to various areas of the world for each two-hour period throughout the day. An Eastern QTH has been chosen for this example, but similar plans can be devised for Central and Western locations.

Time EST	Optimum Band (Meters)	Areas To Which Band Is Expected To Be Open
00–02	40	Most of Europe, Eastern Mediterranean, and Middle East. Most of Central and South America. A few African areas and possibly Antarctica.
02–04	20	Some South Pacific, New Zealand, and Australasia. A few Far East and Asian areas. Some South America and Antarctica.
04–06	40	South Pacific, New Zealand, Australasia. Many South American areas. A few Far Eastern and Asian areas. Possibly Antarctica.
06–08	20	Most of Europe. South Pacific, New Zealand, and Australasia. Most of Central and South America. A few African areas. Some Far East and Asian areas.
08–10	15	All of Europe, Eastern Mediterranean, and Middle East. Some of Africa. Most of Central and South America. South Pacific, New Zealand, and Australasia. A few Asian areas.
10–12	10	Most of Europe and Africa. Most of Central and South America. A few Asian areas, New Zealand, South Pacific, and Australasia.
12–14	15	Some of Europe and most of Africa. Most of Central and South America. A few areas of South Pacific, New Zealand, and Australasia.
14–16	15	Most of Africa, and Central and South America. Some of South Pacific, New Zealand, and Australasia. A few Asian areas.
16–18	20	Most of Europe, Eastern Mediterranean, and the Middle East. All of Africa, and Central and South America. A few Australasian areas.
18–20	15	Lots of South Pacific, New Zealand, and Australasia. Some of Far East and Asia. Most of Central and South America. Possibly Antarctica.
20–22	20	Most of Africa, Far East, South Pacific, New Zealand, Australasia, Central and South America. A few European areas and Middle East. Some Antarctica.
22–00	20	Lots of Far East, South Pacific, New Zealand, Australasia, Central and South America. A few African and Asian areas. Antarctica.

**Similar work plans can be devised for single-band operation or for openings to specific DX areas.*

Table I– Sample multi-band work plan for Eastern USA QTH.

Do-It-Yourself Forecasting

Each successive year sees improvements made in available HF propagation computer programs, as well as new programs entering the market. Several are worth mentioning, generally as useful aids in predicting path openings, and specifically for use during the contest period.

I have mentioned in previous columns that the *CQFCST* developed by Jack Baldwin, VE7RG, is ideal for rearranging the *CQ* DX Propagation Charts to meet spe-

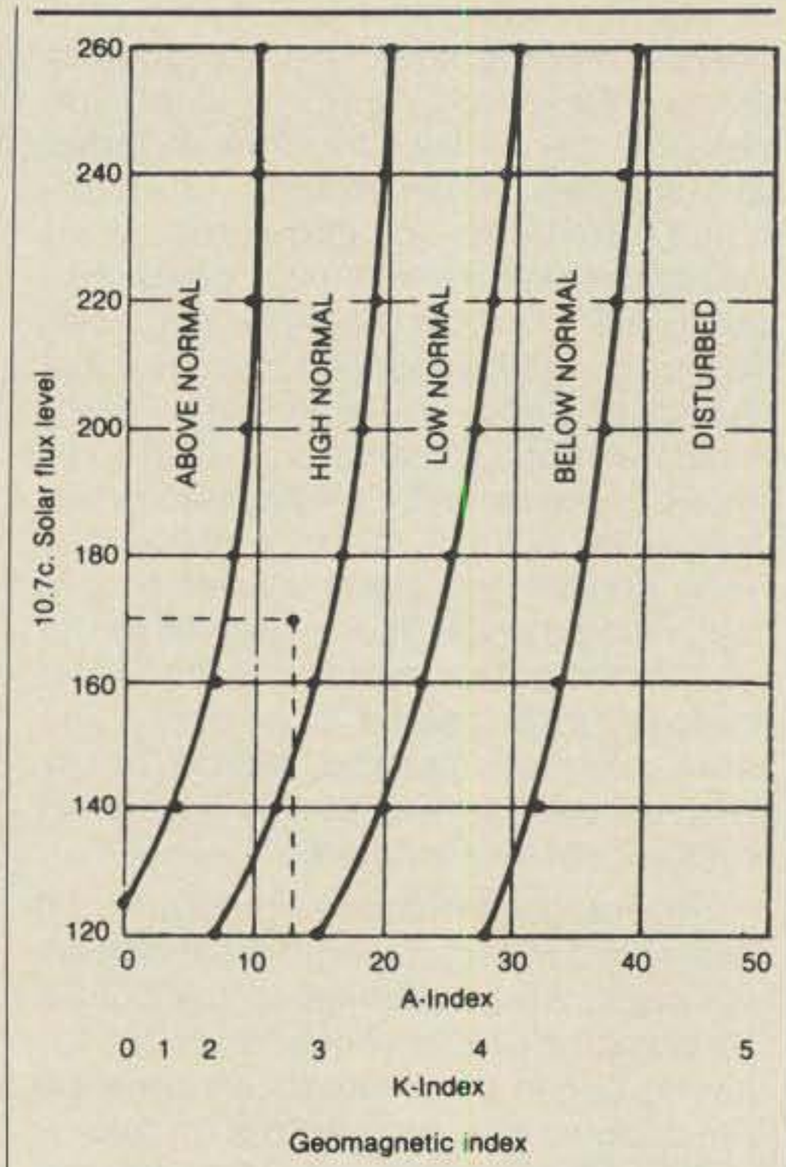

Fig. 1– Intersection of given values of solar flux and geomagnetic activity determine expected HF ionospheric propagation conditions. (Example: Solar flux is 170 and A-index is 13; expect High Normal condition.)

cific operating habits. Other versions of Table I for use during the contest can readily be developed from the *CQFCST* program. The program is available as shareware directly from Jack Baldwin at the following address, but be sure to provide an IBM-PC™ or clone-formatted disk, and IRCs for sufficient return postage: Jack Baldwin, VE7RG, 2423 W. Tucana St., Tucson, AZ 85745.

If you have a modem-equipped personal computer, you can obtain a wealth of updated daily summaries of solar and geophysical activity and a daily HF propagation summary and forecast (updated every six hours) directly from the NOAA Space Environmental Services Center (SESC) bulletin board in Boulder, Colorado. Information about a variety of other useful SESC services and products is also posted on the board.

The SESC bulletin board is in operation 24 hours each day. Modem-equipped PCs can access the system by dialing (303) 497-5000. Either 300 or 1200 baud can be used. Protocol is the standard 8-bit data word with one stop bit and no parity. There is no charge for the data that can be obtained from the SESC bulletin board, but the telephone call is not toll-free. This bulletin board can provide the most comprehensive real-time propagation data concerning solar and geomagnetic conditions available during the contest period.

Fig. 1 can be used with the updated values of geomagnetic activity (Ap or K figures) and the latest reading of solar flux available from SESC to determine real-time day-to-day conditions, in terms of Disturbed, Below Normal, Low Normal, High Normal, or Above Normal. If you do not have a modem-equipped computer, the latest geomagnetic and solar flux levels can be obtained from National Bureau of Standards Radio Station WWV broadcasts at 18 minutes past each hour. These broadcasts are transmitted simultaneously on 2.5, 5, 10, 15, and 20 MHz. They contain the latest available geomagnetic Ap and K figures, as well as the 10.7 cm solar flux level and a short-term forecast of expected conditions. The same information can be obtained at any time by calling (303) 497-3171 (collect calls will not be accepted).

Several good computer programs are available for supplementing band-opening predictions contained in the *CQ* DX Propagation Charts appearing on the following pages. A simple-to-use program requiring no special graphics or color is MINIPROP.2™. This program, for use with an IBM-PC or a clone, was written as shareware by Sheldon Shallon, W6EL, and produces a wealth of useful propagation data, including predictions for around-the-clock short- and long-path band openings between path terminals located anywhere in the world. The pro-

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8 KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates the best time to listen for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. Appropriate *standard* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts c.w., or 1 kw. p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level for each 10dB loss, it will lower by one level.

6. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

October 15 - December 15, 1988
Time Zone: EST (24-hour time)
EASTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	06-07 (1) 07-08 (3) 08-13 (4) 13-14 (3) 14-15 (1)	06-07 (1) 07-08 (3) 08-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	04-06 (2) 06-09 (4) 09-10 (3) 10-12 (2) 12-14 (3) 14-18 (4) 18-20 (3) 20-22 (2) 22-00 (1) 00-02 (2) 02-04 (3)	16-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-23 (2)* 23-01 (3)* 01-02 (2)* 02-03 (1)*
Northern Europe & European USSR	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4) 11-12 (2) 12-13 (1)	06-07 (1) 07-08 (3) 08-13 (4) 13-14 (3) 14-15 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-17 (3) 17-19 (4) 19-21 (3) 21-23 (2) 23-01 (3) 01-04 (2)	17-19 (1) 19-02 (2) 02-04 (1) 20-03 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-09 (3) 09-13 (4) 13-14 (3) 14-15 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-12 (1) 12-15 (2) 15-17 (3) 17-22 (4) 22-00 (3) 00-01 (2) 01-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-00 (1)*
Western Africa	06-07 (1) 07-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	04-05 (1) 05-07 (2) 07-14 (3) 14-20 (4) 20-22 (3) 22-00 (2) 00-01 (1)	03-04 (3) 04-06 (2) 06-13 (1) 13-15 (2) 15-17 (3) 17-03 (4)	18-22 (1) 22-01 (2) 01-03 (1) 00-03 (1)*
Eastern & Central Africa	07-08 (1) 08-09 (2) 09-12 (3) 12-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (3) 09-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-22 (2) 22-00 (1)	03-05 (2) 05-09 (1) 12-14 (1) 14-16 (2) 16-17 (3) 17-01 (4) 01-03 (3)	19-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Southern Africa	07-08 (1) 08-10 (3) 10-14 (4) 14-16 (3) 16-17 (2) 17-18 (1)	06-08 (1) 08-11 (2) 11-13 (3) 13-16 (4) 16-18 (3) 18-20 (2) 20-22 (1)	06-09 (1) 11-14 (1) 14-15 (2) 15-17 (3) 17-21 (4) 21-02 (3) 02-05 (2)	18-19 (1) 19-22 (2) 22-23 (1) 19-21 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 20-22 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-20 (1) 20-22 (2) 22-00 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	18-21 (1) 06-08 (1)
Southeast Asia	10-12 (1) 12-14 (2) 14-15 (1) 17-18 (1) 18-20 (2) 20-21 (1)	09-10 (1) 10-12 (2) 12-13 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	02-06 (1) 06-09 (2) 09-11 (1) 18-21 (2) 21-23 (1)	18-20 (1) 05-07 (1)
Far East	08-10 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (1)	08-09 (1) 09-11 (2) 11-12 (1) 16-17 (1) 17-18 (2) 18-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	00-04 (2) 04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 16-18 (1) 18-20 (2) 20-00 (3)	04-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
South Pacific & New Zealand	09-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	08-09 (1) 09-11 (2) 11-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	13-19 (1) 19-21 (2) 21-22 (3) 22-02 (4) 02-04 (3) 04-07 (2) 07-10 (3) 10-13 (2)	00-02 (1) 02-03 (2) 03-07 (3) 07-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	08-09 (1) 09-11 (2) 11-12 (1) 14-16 (1) 16-17 (2) 17-18 (3) 18-19 (4) 19-20 (2) 20-21 (1)	07-08 (1) 08-11 (2) 11-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	07-08 (3) 08-10 (4) 10-11 (3) 11-12 (2) 12-14 (1) 17-19 (2) 21-23 (1) 23-00 (2) 00-01 (3) 01-03 (4) 03-04 (3) 04-07 (2)	03-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (2) 08-11 (4) 11-13 (3) 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-08 (3) 08-11 (4) 11-13 (3) 13-20 (4) 20-21 (3) 21-23 (2) 23-01 (1)	07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-02 (4) 02-03 (3) 03-06 (2) 06-07 (3)	18-19 (1) 19-21 (3) 21-04 (4) 04-06 (2) 06-07 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-09 (4) 09-11 (3) 11-15 (2) 15-16 (3) 16-20 (4) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-22 (4) 22-23 (3) 23-00 (2) 00-01 (1)	06-08 (2) 08-11 (1) 14-16 (1) 16-17 (2) 17-19 (3) 19-02 (4) 02-03 (3) 03-05 (2) 05-06 (3)	20-23 (1) 23-04 (2) 04-06 (1) 23-04 (1)*
McMurdo Sound Antarctica	16-17 (1) 17-19 (2) 19-20 (1)	15-17 (1) 17-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	16-18 (1) 18-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1) 07-09 (2) 09-10 (1)	00-06 (1)

Time Zones: CST & MST
(24-hour time)
CENTRAL USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	06-07 (1) 07-08 (3) 08-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-08 (3) 08-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	03-06 (1) 06-08 (3) 08-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-00 (1) 00-03 (2)	17-18 (1) 18-20 (2) 20-23 (3) 23-01 (2) 01-02 (1) 19-20 (1)* 20-23 (2)* 23-00 (1)*
Nothern & Central Europe & European USSR	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (3) 08-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-16 (3) 16-17 (4) 17-19 (3) 19-20 (2) 20-22 (1) 22-02 (2)	18-20 (1) 20-23 (2) 23-01 (1) 20-23 (1)*

29th ANNUAL

TROPICAL HAMBOREE

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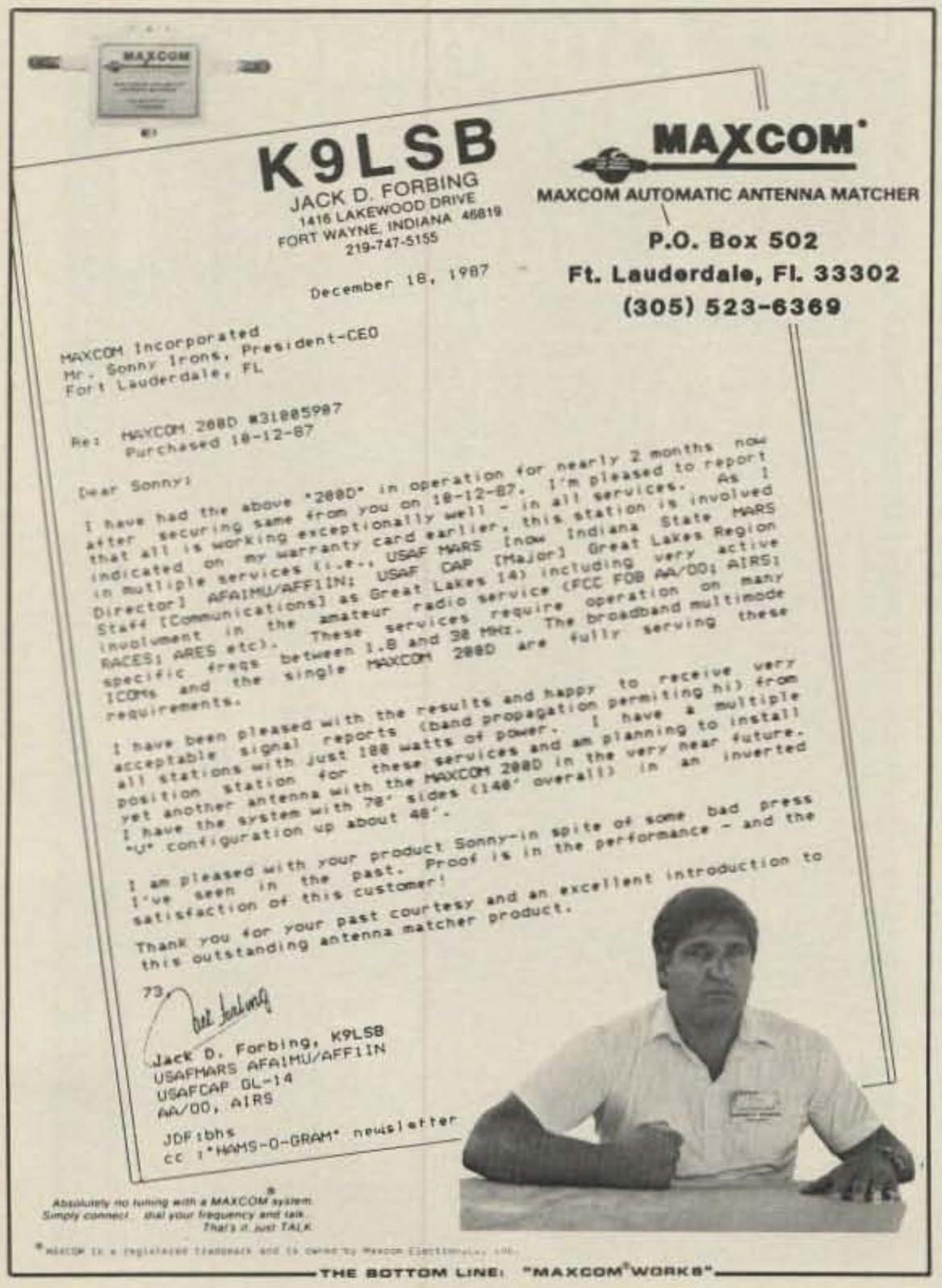

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Eastern Mediterranean & Middle East	07-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-08 (2) 08-11 (3) 11-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	17-19 (1) 19-22 (2) 22-23 (1) 20-22 (1)*
Western Africa	06-07 (1) 07-11 (3) 11-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	05-06 (1) 06-10 (2) 10-14 (3) 14-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	05-12 (1) 12-15 (2) 15-17 (3) 17-23 (4) 23-01 (3) 01-05 (2)	17-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-09 (1) 09-11 (2) 11-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-12 (2) 12-15 (3) 15-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	06-14 (1) 14-16 (2) 16-19 (3) 19-21 (4) 21-23 (3) 23-00 (2) 00-02 (1)	20-00 (1) 21-23 (1)*
Southern Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-10 (2) 10-12 (3) 12-15 (4) 15-17 (3) 17-18 (2) 18-20 (1)	06-13 (1) 13-15 (2) 15-17 (3) 17-20 (4) 20-23 (3) 23-02 (2) 02-04 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Central & South Asia	07-08 (1) 08-10 (2) 10-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-02 (1) 02-04 (2)	18-20 (1) 06-08 (1)
Southeast Asia	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-13 (1) 15-16 (1) 16-19 (2) 19-20 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-12 (2) 12-13 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-*0 (2) 10-12 (1) 18-19 (1) 19-21 (2) 21-23 (1)	04-07 (1)
Far East	15-16 (1) 16-19 (3) 19-20 (2)	08-10 (1) 15-16 (1) 16-17 (3)	04-05 (1) 05-07 (2) 07-09 (3)	02-03 (1) 03-07 (2) 07-09 (1)

	20-21 (1)	17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	09-10 (2) 10-11 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	03-06 (1)*
South Pacific & New Zealand	09-12 (1) 12-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	08-11 (1) 11-13 (3) 13-16 (2) 16-17 (3) 17-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	11-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-03 (3) 03-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (2)	23-01 (1) 01-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 00-02 (1)* 02-07 (2)* 07-08 (1)*
Australasia	08-09 (1) 09-11 (2) 11-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-08 (1) 08-09 (3) 09-11 (2) 11-12 (1) 16-18 (1) 18-19 (2) 19-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	06-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (1) 15-17 (1) 20-22 (1) 22-00 (2) 00-04 (3) 04-06 (1)	02-04 (1) 04-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-06 (1) 06-07 (2) 07-08 (3) 08-10 (4) 10-13 (3) 13-18 (4) 18-19 (3) 19-21 (2) 21-23 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-00 (4) 00-02 (3) 02-06 (2)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (2) 05-07 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	06-07 (1) 07-08 (3) 08-10 (4) 10-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-13 (2) 13-15 (3) 15-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	04-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3) 02-04 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-04 (2) 04-06 (1) 21-05 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 17-18 (1) 18-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-10 (1) 14-16 (1) 16-18 (2) 18-22 (3) 22-23 (2) 23-00 (1)	06-08 (2) 08-09 (1) 16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-06 (1)	23-05 (1)

October 15 - December 15, 1988
Time Zone: PST (24-hour time)
WESTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	06-07 (1) 07-08 (2) 08-11 (3) 11-12 (2) 12-13 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (4) 12-13 (2) 13-14 (1)	05-06 (1) 06-08 (2) 08-10 (1) 10-12 (2) 12-14 (4) 14-16 (3) 16-18 (2) 18-20 (1) 23-01 (2)	18-20 (1) 20-22 (2) 22-00 (1) 19-23 (1)*
Central & Northern Europe & European USSR	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	05-07 (1) 07-09 (3) 09-10 (2) 10-14 (1) 14-17 (3) 17-19 (2) 19-23 (1) 23-02 (2) 02-03 (1)	18-20 (1) 20-22 (2) 22-23 (1) 19-22 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (2) 16-18 (1) 18-20 (2) 20-22 (1) 00-02 (1)	18-22 (1) 06-08 (1)
Western Africa	06-07 (1) 07-08 (2) 08-11 (3) 11-13 (4) 13-15 (3) 15-16 (2) 16-17 (1)	05-06 (1) 06-07 (2) 07-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-10 (1) 10-14 (2) 14-15 (3) 15-20 (4) 20-22 (3) 22-02 (2) 02-03 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-08 (1) 08-10 (2) 10-14 (3) 14-15 (2) 15-16 (1)	06-08 (1) 08-12 (2) 12-16 (3) 16-17 (2) 17-19 (1)	06-14 (1) 14-16 (2) 16-22 (3) 22-23 (2) 23-00 (1)	18-21 (1) 06-08 (1)
Southern Africa	07-08 (1) 08-10 (3) 10-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-10 (1) 10-12 (2) 12-13 (3) 13-16 (4) 16-17 (3) 17-19 (2) 19-21 (1)	06-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-01 (2) 01-03 (1)	17-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-19 (1)*

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CIRCLE 36 ON READER SERVICE CARD

Central & South Asia	16-17 (1) 17-19 (3) 19-20 (1) 07-09 (1)	16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1) 07-09 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 16-17 (1) 17-19 (3) 19-21 (2) 21-22 (1)	17-19 (1) 04-09 (1)
Southeast Asia	08-09 (1) 09-10 (3) 10-11 (4) 11-12 (3) 12-13 (2) 13-14 (1) 14-15 (2) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-11 (3) 11-12 (2) 12-15 (1) 15-17 (3) 17-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1) 19-22 (1) 22-01 (2) 01-03 (3) 03-06 (2)	02-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
Far East	13-14 (1) 14-15 (3) 15-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-15 (3) 15-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-14 (2) 14-18 (1) 18-20 (2) 20-21 (3) 21-23 (4) 23-02 (3)	23-01 (1) 01-05 (2) 05-07 (3) 07-08 (1) 01-05 (1)* 05-06 (2)* 06-07 (1)*
South Pacific & New Zealand	08-09 (1) 09-10 (2) 10-19 (4) 19-21 (3) 21-23 (2) 23-00 (1	07-08 (1) 08-11 (4) 11-18 (3) 18-00 (4) 00-02 (3) 02-03 (2) 03-04 (1)	11-18 (1) 18-19 (2) 19-21 (3) 21-04 (4) 04-07 (3) 07-09 (4) 09-10 (3) 10-11 (2)	21-22 (1) 22-00 (2) 00-07 (3) 07-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Australasia	09-11 (1) 11-12 (2) 12-14 (4) 14-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	07-08 (1) 08-12 (3) 12-14 (2) 14-18 (1) 18-20 (2) 20-21 (3) 21-00 (4) 00-01 (3) 01-02 (2) 02-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-04 (4) 04-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-14 (1)	02-03 (1) 03-04 (2) 04-07 (3) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-06 (1) 06-07 (2) 07-10 (4) 10-13 (3) 13-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	06-07 (3) 07-09 (4) 09-10 (3) 10-13 (2) 13-15 (3) 15-23 (4) 23-01 (3) 01-06 (2)	18-19 (1) 19-21 (3) 21-02 (4) 02-05 (2) 05-06 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil Chile Argentina & Uruguay	06-07 (1) 07-13 (3) 13-17 (4) 17-18 (3) 18-19(2) 19-20 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-13 (2) 13-15 (3) 15-20 (4) 20-22 (3) 22-00 (2) 00-01 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-23 (4) 23-01 (3) 01-03 (2) 03-05 (1) 05-07 (2) 07-09 (1)	20-22 (1) 22-04 (2) 04-05 (1) 22-04 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 19-20 (1) 20-22 (2) 22-23 (1)	06-07 (1) 07-09 (2) 09-12 (1) 14-17 (1) 17-20 (2) 20-23 (3) 23-01 (2) 01-02 (1)	16-18 (1) 18-20 (2) 20-04 (3) 04-05 (2) 05-06 (1) 06-08 (2) 08-10 (1)	00-05 (1)

Indicates best time to listen for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a Propagation Index of (2), or higher. *F-2 layer DX openings on 6 Meters may occur at the same times and over the same paths shown with a Propagation Index of (4) under the 10 Meter column.*

gram also produces sunrise and sunset times, grayline times and bearings, and great-circle distances and bearings. A special feature of the program is the *DX Compass,* which for any location at a specific time will show the MUF in all directions at 30 degree intervals.

MINIPROP.2™ is well-prompted, self-explanatory, and easy to use. Details for its availability can be obtained directly from: Sheldon C. Shallon, W6EL, 11058 Queensland Street, Los Angeles, CA 90034.

Base(2) Systems (2534 Nebraska Street, Saginaw, MI 48601) has produced a trio of very useful propagation programs. BANDAID™, for example, is intended for IBM and clone PCs, with color/graphic cards. At the heart of the program is the propagation forecasting module, which makes it possible to predict band-opening conditions between any two points on earth. The results can be presented in either tabular or graphical form. Distance and bearings between stations are also provided, as are sunrise/sunset times and grayline data.

The program also includes several other very useful features such as a UTC time-conversion table, a list of 10 and 20 meter beacon stations, a QSL databank, and a list of authorized amateur bands by class of license. The program also contains a world map that can be used to display the location of any station. The program is menu-driven, can be customized for your location, and is easy to use.

Base(2) Systems also produces a program called MUFPLOT™, which is designed for use with Commodore and Apple II computers. While not as comprehensive as BANDAID™, it can be used for band-opening predictions.

The third Base(2) product, which was introduced during 1988, is called MUFMAP™. This is the most advanced propagation program that I have seen for radio amateur use. Its graphics are superb, and band openings are displayed on a world map in a manner previously only available in very advanced professional programs. It is also possible to produce a *MufMovie* with the program. This is a series of map-presented band openings in which solar flux, time of day, and date can be varied, and then presented frame after frame for comparison, much like a movie. Despite it being an advanced program, it is menu-driven and easy-to-use.

More complete details and pricings are available directly from Base(2) Systems. MUFMAP™ is only available for IBM-PC and clone computers.

Another excellent program which previously was only available for Commodore 64 and 128 owners, but which has recently also come out in an IBM-PC version, is the Super DX Edge™. In addition to calculating the MUF and great-circle bearings and distances between any two locations, the program gives a detailed graphical presentation of grayline conditions. It lets you see the shape and position of the grayline on keystroke command displayed on a high-resolution world map. At the same time you can see the area of the world in daylight and the part in darkness. If you do not have a computer, a slide-rule version of the DX Edge™ is available. This version calculates the grayline, but does not produce propagation band openings. For additional information and pricing data for both the Super DX Edge™ and the DX Edge™, write directly to Xantek, P.O. Box 834, Madison Square Station, New York, NY 10159.

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CIRCLE 85 ON READER SERVICE CARD

Lee Wical, KH6BZF, puts out an excellent weekly newsletter full of interesting propagation information and containing advanced forecasts of HF and VHF ionospheric openings. Write directly to KH6BZF at 45-601 Luluku Road, CRT No. 4411, Kane 'Ohe, Hawaii 96744-1854 for more complete details, availability, and pricing. Enclose an SASE for reply.

If you do not already have a copy of the *Shortwave Propagation Handbook* by myself and Theodore J. Cohen, N4XX, then you might want to get one to read *before* the contest begins. Copies are still available from the *CQ* Book Shop, 76 North Broadway, Hicksville, NY 11801 for $8.95 postpaid (plus $2.00 shipping and handling).

Radio Storm

If Mother Nature should play a trick and produce a radio storm during the contest periods, expect conditions to drop to Below Normal or Disturbed to many areas of the world, depending on the storm's severity. The storm's influence will generally extend outwards from the polar regions, the more severe the storm becomes. Under storm conditions, expect considerably fewer openings on *10, 15,* and *20* meters, with weaker signals, increased fading, flutter fading, and higher noise levels. Paths passing through the polar regions and the upper latitudes are often more adversely affected than signals coming from mid and lower latitudes.

Conditions on *40, 80,* and *160* meters are likely to become erratic as well. During certain types of storms, conditions may actually improve at times for openings on all bands towards southern and tropical areas, and on *40, 80,* and *160* meters during the hours of darkness.

If a radio storm should develop, concentrate on working trans-polar paths on *10, 15,* and 20 meters during the daylight hours. Check the *40, 80,* and *160* meter bands for possible openings to some areas of the world during the hours of darkness.

VHF Ionospheric Propagation

October looks like a good month for ionospheric propagation on the VHF bands. The continuing high level of solar activity, along with seasonal changes in the ionosphere, should produce some fairly good DX openings on the *6* meter band during the daylight hours. The best times for such openings, and the areas of the world to which they may be possible, are shown in the accompanying DX Propagation Charts with a **. Generally speaking, openings from the eastern half of the country towards Europe and Africa may be possible before noon. The best chance for *6* meter openings towards the Caribbean and Central and South America from all areas of the USA should be from an hour or two after sunrise through the early afternoon. In the western half of the country look for openings towards the South Pacific, Australasia, and the Far East during the late afternoon hours.

Orionids, a major meteor shower, is expected to begin around October 20th and last for about two days. Expect as many as 25 meteors an hour to enter the earth's atmosphere during the peak of the shower. This should make possible some fairly good meteor-type ionospheric openings on the VHF bands.

There is usually a seasonal increase in auroral activity during October. This should result in an increased number of auroral-scatter-type openings on the VHF bands. There are also increased chances for short-skip sporadic-*E* propagation during periods of auroral activity, particularly on *10* and *6* meters. Check the Last Minute Forecast appearing at the beginning of this column for the days that are expected to be Below Normal or Disturbed. These are the days upon which auroral activity is most likely to occur during the month.

CW Contest Forecast

This month's DX Propagation Charts are valid for both the phone and CW sections of the contest. Be sure to keep them handy for use during next month's CW section as well. Short-Skip Propagation Charts for use during October appeared in last month's column.

Experience from the past 37 contest years has shown that DX Contests are excellent periods in which to test the accuracy of prediction and forecast methods used in this column. Contests generate a large amount of activity in every corner of the world and on all HF bands. Previous results and observations have helped considerably in improving the accuracy of this column. Comments concerning the 1988 contest and the accuracy of these forecasts and predictions would be appreciated, and should be sent directly to W3ASK at P.O. Box 1714, Silver Spring, MD 20902. *Good luck in the contest!*

73, George, W3ASK

MufMap BandAid Mufplot

MufMap: for the first time, see world wide propagation conditions at a glance! MufMap indicates all 10m, 15m, and 20m band openings on a map of the world; all at the same time! By using different colors (color monitor) or different types of cross hatching (b&w monitor) you can see, for any given time of the day, to what parts of th world these three bands are open to. **But wait, there's more:** by combining a series of automatically generated MufMaps, you can create and watch MufMovies. Watching a MufMovie can show you how and why propagation changes throughout the day! Many features, 8087 support, must see to believe. **MufMap** runs on IBM PCs and compatibles, requires 256K and a color/graphics card (color monitor not required). Just $59.

BandAid: this is probably the most comprehensive propagation forecasting program available to amateur radio operators. You can make MUF & LUF graphs and tables, grayline predictions, maintain a QSL database, find international beacon frequencies, locate any station on a world map, maintain a database containing information on over 550 targets, time zone conversions, authorized frequency listings, and have control over many of the programs defaults. Over the years, we've sold hundreds of BandAids & Mufplots. Through steady improvements, BandAid is still the best propagation program available (with the possible exception of MufMap) Now includes 8087 support. **BandAid** runs on IBM PCs and compatibles, requires 256K and a color/graphics card (color monitor not required). Still only $69.

Mufplot: a popular propagation program for C64 and Apple][users. MUF & LUF graphs & tables, distance/bearing calculations, and more ... Hundreds in use ... Still a deal at $30.

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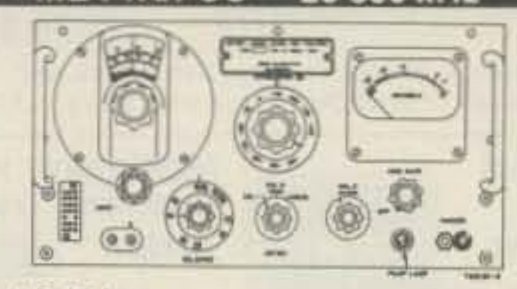

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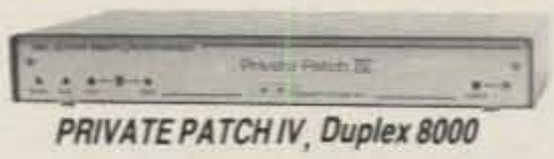

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DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATION AROUND THE WORLD

I have been here before,
But when and why I cannot tell. . . .

A long time back we realized that DXers always like to talk about DX and DXing. They never tire of it. We were practicing our belief with one of the Locals recently when he asked, "Whatever happened to that fellow who would often proclaim 'DX Is!'? Frankly, I never did understand what he was talking about."

It is a truism that any DXer at all is naturally smart, and those on the Honor Roll are the smartest of all. The intelligence of a DXer can always be measured by DXCC country totals. But we were not too sure about ourselves and especially so when years back that Local had come trotting up the hill, bursting with self-assurance and overwhelming confidence, grandly advising us that he had come prepared—prepared to explain away the Eternal Enigmas of DXing, to sweep aside the veil of the Mysteries of the Ages, to analyze to the point of complete understanding the Mystique of DXing, and, in short, to explain everything that any DXer might want to know and to explain it simply and adequately. That Local came with the DX Word. We were most eager to learn it and more of the DX Truths. He was ready to talk.

Drawing himself up to his full height, that Local had proclaimed "DX Is!" and that was it, nothing else. It was not only it, but the Local was incredulous when we asked it to be explained. None was needed, he protested, the hint being that any DXer not understanding might be lacking some of the noble essentials of a DXer. When we intimated that there might be a few spots which needed clarification for us, we knew that we had failed. His expression spoke it. Hardly repressing his indignation with us for being "slow learners," he raised himself even an inch or so higher and piped up at us, "DX Is!" And that was all he would say. We have wondered and been haunted by his words ever since. What was it that we were missing?

"How have you been?" he inquired, perhaps a bit offhandedly, we thought. We were quick to say that we had not been well, thinking to ourselves that it had to be more an illness of the spirit than the body. This one always did do something to us. Never could we recall feeling good after one of his visits. Never have we been anything but confused, baffled, and frustrated. There are things in DXing that are hard to bear, and that Local was one of them.

"How are you doing with your understanding of the inner fabric of DXing?" he was bound to ask, and we were just as quick to admit that things had not been going well. To say anything also might be to invite an examination of our comprehension, and we were not prepared to debate the finer points of the mysteries and mystique of DX. "How about yourself?" we countered. "Learn anything new and interesting lately?" As long as we live we will regret asking that question. Obviously it was what he had been waiting for, he actually swelling up with pleasure before our eyes. He was ready to deliver.

77 Coleman Drive, San Rafael, CA 94901

Ernest, 4S7EA, is one of the very active Sri Lanka stations. QRV all bands from 6 through 160 meters, including OSCAR 10, SSB, CW, RTTY, and AMTOR. (Photo via Jack, W2LZX)

"Just a little," he modestly advised us, looking up as he moved in even closer. "You will recall how years back 'DX Is!' opened the door to a better understanding by DXers. In recent years I have devoted myself to gaining a more fuller understanding of the DXer himself." We liked that "more fuller" terminology. Perhaps this one might even admit that he did not know everything, that there was yet more to be added to his vast knowledge. But all we could think was "Why us?" There was no ready answer.

"You must understand," that Local continued, "that the notion exists that DXing itself is but a manifestation of a DXer's painful struggle to cope with his own unconsciousness, specifically that side of his nature which drives him to seek a higher position on the DXCC ladder, higher than anyone else." We must have blinked, because while we understood the words, the thought escaped us. We could see the lip of that Local start to curl. "Certainly," he raced on, "you understand why any DXer, and especially those on the Honor Roll, are adamant in resisting any suggestion to drop the deleted countries from their overall count, right."

Of course he was right. We did understand —understand at least that those on the Honor Roll generally are reluctant to lose any counting of their deleted countries. Having gotten us past that hurdle, that Local continued. "And this struggle, essential in the DXer's quest for dominance, is manifested to him in his DXCC total. And who can say that there is anything more important to a DXer than his total country count, including the deleted ones? Who can?" We weakly admitted that we could not. It was a safe position and that Local continued.

"When interpreting the progress of a DXer," the Local added, "you must regard it all as part of a trinity. There is the initial step of gaining a license and an awareness of DXing. The second step is always the achievement of a DXCC and entry into the higher reaches of amateur radio. The third step, and the most difficult, is the Honor Roll. But the status and exaltation of the Honor Roll is not a matter of a fixed value. It is the totality of your Honor Roll standing, this including the deleted countries, which is the final criteria. You must not only have every currently valid country on the DXCC list, but you must also add in the deleted countries. The combined total is the important figure. Right!"

Of course he was right. This was understandable. A country is a precious commodity to a DXer, and once gained it lives forever. The accomplishment can not be deleted—never! We could easily understand this, but there were still the other statements to puzzle us. There was short time to wonder before that Local was off again.

"Always regard any DXer as one in transition," he continued, "in transit between the time and memory of his first license and his first DX contact and the top of the Honor Roll. Every DXer is in transit, but mostly he caught between these two poles. A DXer is condemned to struggle always to achieve his full DX potential. The journey is often long and not without pain, scars, and bruises. The DXer's psyche is always marked by pain, denial, and frustration. Some, caught in the clutches of disappointment, even resort to calling 'CQ DX' in an effort to maintain their desire to grow as a DXer. The plaintive call of repetitive 'CQ DX' springs from the half-life of the subconscious. They tend to believe that the failure to call 'CQ DX' signifies their relinquishing of DX hope and honor and a resignation of one's self to a life of DX denial. But they also know that the act of calling 'CQ DX' is counter to the DXer's Code, the end result being even more frustration and a lesser stature among other DXers." The Local paused to note whether we were following all of this, asking almost imperiously, "You do see the end result, certainly you must?"

What could we say? We just nodded our heads. Any other effort would have been disastrous. All we could think was that this had to end sometime. It just had to. That Local smiled.

"You surprise me," he conceded, "and you are definitely more knowledgeable than you were some years back. You can learn. Possibly just part of the natural development of a DXer, I presume." And with that he was gone, his mission apparently accomplished, he pausing for one last admonition. "Keep up the good work," he shouted. There was not even enough time to ask, "Which one?" We would like to know, even one, where he might consider us qualified for such effusive praise.

Long ago and in another decade far, far away we did learn that while a DXer might not actually know all the answers, the smart ones

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know where to find an answer when one is needed. But what might be the answer to all the Local had told us?

The Old Timer came pacing down the hill one bright morning, the ocean fog still in a layer over the East Bay. But it was clear and cool on our side. We were waiting for him, waiting to recount the thoughts and message of that Local. We wanted to hear what the Old Timer had to say about all of it.

As best we could, we recounted the things that Local had said to us. We anticipated some thought, discussion, and introspection. Maybe even some analysis from the Old Timer. We got hardly any of that at all. All he did was laugh at us!

Son of a gun! What were we to say? We could think of nothing, so we said nothing. But the Old Timer had something to say and he was primed.

"Look," he said, and there was neither sympathy nor understanding in the tone of his voice. "Do you DX for your own personal enjoyment or because you wish to sample the Joys of Ontology?" We understood the first part of his sentence but not the last. Maybe it was time for more confusion, but we quickly spoke. "For our own enjoyment. And because we get a lot of fun out of it. Isn't that right?"

It must have been, because the Old Timer moved on a bit. "So why do you listen to all that bafflegab that the Local tells you?" the Old Timer demanded. "Why can't you just listen and forget? Would you be any worse off?" We had to admit that we would not. Possibly we might even feel better and worry less. We should have quit while we were ahead, but we had to ask questions.

But what about him saying that calling 'CQ DX' is a response to the demand of the half-life of one's subconscious? Haven't you said something like that over the years?" It was not a good question to ask.

"No, it is not!" the Old Timer growled. "I have long thought that calling 'CQ DX' is not only a waste of time, an illusion that rare DX stations might be listening for your call, but also poor utilization of spectrum. And I still say that no true-blue DXer does it."

Somehow we were getting the feeling that the Old Timer was not especially concerned about the Mysteries of the Ages, the Eternal Enigmas, or possibly even the Mystique of DXing. But we needed guidance. We had to ask the Old Timer just what should one do when full understanding is yet to come. But we also remembered that years back when many worried over their understanding of "DX Is!" he had given it hardly any attention at all.

"What should you do?" the Old Timer asked. "Forget them! Forget them and just

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work DX and enjoy yourself. Everything else is nothing. You are a DXer, not a worrier. And what benefit does it bring you? Nothing!"

This was hardly answering all our questions, but it did lift some of the pressure. But we could not forget that always there seems to be something to be explained, something to learn, and something to study. "Tell us," we said, "isn't there anything at all in DXing that puzzles you? Are there answers to everything and do you really know them all?" We thought that this question covered so much territory that we could hardly miss. We were right. There was something that puzzled the Old Timer.

"For a long time," the Old Timer said, "I have been mystified about some behavior of DXers. Possibly some may consider it only a matter of trifling importance, but since I have noted it so many times, I must wonder." The Old Timer paused, but he held our attention. If we could understand what he wondered about, perhaps we could understand other things. We waited and finally the Old Timer continued.

This is the group of SV DXers who put the Mt. Athos operation on a few months back. From the left you will note SV2QO, SV2WT, SV2UA, SV2TX, SV2UF, and SV2RE. The latter is Nick Georgiadis, President of the Radio Amateur Union of Northern Greece. Each operator signed his own call /SY. In 13 days this group made 22,848 QSOs.

"Have you ever wondered about the mature DXers? Those with the signs of maturity—the full figure and front veranda are the ones I am thinking of. Tell me, why do these obviously favor tight, knitted polo shirts when they emerge into the sunlight? Is there a reason?"

"You tell us," we demanded. "What is the reason?" All we got was a short laugh. "When you have the answer to that one, I will help you with the other questions," was all he would say. And all he left us with was the conviction that there were still some eternal mysteries to explain. But we decided that first we would tend to DXing and worry about the enigmas later—possibly in a couple of years or so.

Spratly

We are convinced that if you have the background information, you will be in a better position to understand when the subject is in the foreground. And Spratly will be back one of these days. Just don't ask when.

In the interim Arch Doty, K8CFU, sends along some information from the *Beijing Review* wherein mainland China seeks to protect its claim to the ancestral islands of Xisha and Nansha. They also refute the claims of Vietnam, noting that until 1974 that country had officially recognized the legitimacy of the People's Republic of China. It might be interesting to note the citations that mainland China offers to support its claims.

The article in the *Beijing Review* notes that the Nansha Islands (also known as the Spratlys) cover an area of 500 nautical miles north to south and 400 nautical miles east to west in the South China Sea and consist of more than 230 islands, reefs, beaches, and sand bars, more than 100 of which have been given names. Twenty islands rise above sea level, the largest being Taiping Island with an area of about a quarter square mile. The islands are considered to be significant economically and militarily—economically because of possible petroleum prospects, militarily because of their location on shipping routes.

China claims that the islands were discovered, developed, and administered as early as 200 B.C. during the Han Dynasty. There is a claim of Chinese population on the islands during the Tang and Song dynasties—from 618 to 1279 A.D., and in the Ming and Ching dynasties from 1368 to 1911, putting the islands very definitely under Chinese administration. In 1930 France made a territorial claim, and in 1939 the Japanese occupied the islands as they worked into World War II. In 1946 at the end of the hostilities China claims they reclaimed the islands, though Taiwanese troops continue to be stationed on Taiping Island.

The *Beijing Review* notes that at a peace-treaty conference with Japan held in 1951 Andrei Gromyko stresses that the islands are "...China's inalienable territory." Also cited is the statement attributed to the vice-foreign minister of Vietnam (Democratic Republic of Vietnam) that the islands "are historically part of Chinese territory." The statement also acknowledged the claim dating back to the Song Dynasty.

In 1975 the Vietnamese government changed its mind on the matter and started claiming the Spratlys, producing revised maps of the area and sending troops to occupy and establish facilities on some islands. In 1988 it is reported that the Vietnam activity has intensified, they taking over nine islands and sending naval vessels into the area. This led to an armed clash on March 14th, China accusing Vietnam, in the *Beijing* article, of willfully provoking it.

The *Beijing Review* article states that it is well-known that since 1975 when Vietnam liberated the southern part of that country it has adopted an ambitious policy to expand its territory by invading Kampuchea, launching armed provocations along the China/Vietnam border, stepping up its occupation of the Spratlys and declaring itself "... the third-ranking military power in the world." The *Review* article concludes by promising that unless Vietnam changes "their aggressive and expansionist policy, ..." they will suffer.

What does all this mean to a DXer? You might note that when the Spratlys were first put on the air they were considered "unclaimed" territory, the first operation using the 1S call sign which was then and still has not been assigned by the ITU.

The second effort used the call 1S1A. A query at that time on the proper call sign brought the brusque reply "I don't give a damn what call sign they use as long as they can prove they were there."

There have been other efforts, not too many, one with unfortunate results. But it must be considered that if some country does manage to make permanent a claim to the islands, it would seem that the prior status of these islands—that anyone landing and proving they were there would be accepted as a valid operation—might be changed.

Maybe there will be a Spratly operation in the future, but don't count on there not being changes. Evidently, venturing into the area can be perilous. Also evident is the strengthening determination of some of the claimants to possibly seek a military solution to differences of opinion. It could be a long wait before you hear the Spratlys again, and the call could be something other than 1S prefix should anything develop.

Youngest Honor Roll Member

For a couple of years now we have been trolling the line, asking who might be the youngest member of the Honor Roll. While some have stoutly claimed that there is no such thing as a young Honor Roller, we have persevered. There must be someone out there under the age of 40.

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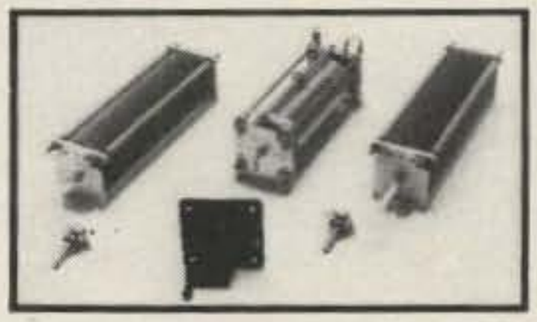

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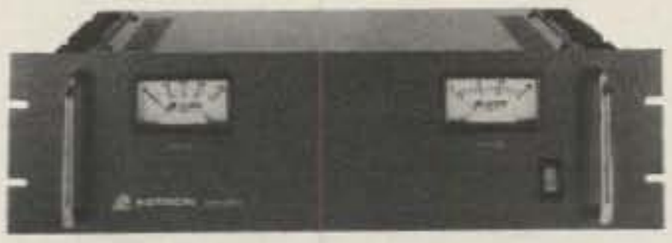

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RM-35A	25	35	5¼ x 19 x 12½	38
RM-50A	37	50	5¼ x 19 x 12½	50
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RM-50 M	37	50	5¼ x 19 x 12½	50
RS-4A	3	4	3¾ x 6½ x 9	5
RS-5A	4	5	3½ x 6⅛ x 7¼	7
RS-7A	5	7	3¾ x 6½ x 9	9
RS-10A	7.5	10	4 x 7½ x 10¾	11
RS-12A	9	12	4½ x 8 x 9	13
RS-20A	16	20	5 x 9 x 10½	18
RS-35A	25	35	5 x 11 x 11	27
RS-50A	37	50	6 x 13¾ x 11	46
• Switchable volt and Amp meter				
RS-12M	9	12	4½ x 8 x 9	13
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RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13¾ x 11	46
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RS-10S	7.5	10	4 × 7½ × 10¾	12
RS-12S	9	12	4½ × 8 × 9	13
RS-20S	16	20	5 × 9 × 10½	18

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VS-20M	16	9	4	20	5 x 9 x 10½	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13¾ x 11	46
• Variable rack mount power supplies						
VRM-35M	**25**	**15**	**7**	**35**	**5¼ x 19 x 12½**	**38**
VRM-50M	**37**	**22**	**10**	**50**	**5¼ x 19 x 12½**	**50**

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The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee $2.00 (U.S.) for each mode, with no fees required for up-dates.

MIXED

3403	YU2AA	2032	N2AC	1553	K8LJG	1278	3A2LF	998	SP5AA
3310	F9RM	2020	SM7TV	1553	SM6DHU	1273	N8BJQ	986	G4SDJ
3053	K2VV	2019	YT7DX	1549	IT9QDS	1272	N2CIC	958	W0JIE
2946	W2NC	2014	I6SF	1549	KL7AF	1269	K2OLG	944	G4OBK
2750	K6JG	2006	PY1APS	1541	W5PWG	1227	WB8ZRL	892	K9BQL
2661	VE3XN	1945	W9NUF	1467	DK5AD	1203	YU1GR	883	I2EAY
2659	YU2TW	1828	4X4FU	1458	W8UMR	1188	K7CU	872	W2XQ
2521	N4NO	1817	K9BG	1441	W6OUL	1179	I1EEW	869	I5ZTC
2502	K6XP	1809	IN3ANE	1436	I1POR	1153	N2AIF	835	OE1KJW
2462	W4BQY	1802	W0SFU	1429	K2POF	1147	JA6GWU	820	KA1BAZ/DV1
2416	W9DWQ	1799	CT1LN	1428	YU2NA	1102	VE5FX	760	YU1PJ
2369	N6JV	1776	PY4OD	1415	G4FAM	1096	HA8XX	750	F1HWB
2355	N4MM	1736	IS0LYN	1414	SM0AJU	1083	DF6EX	750	KI8B
2171	WA8YTM	1722	YU7SF	1373	YU2CQ	1080	WD9IIC	747	YU7RU
2159	YU7BPQ	1701	I2UIY	1350	AC2J	1066	NE6I	729	W4WKQ
2135	EA2IA	1699	YT3AA	1345	YU7AJD	1052	PY2DBU	719	KY3V
2131	I8YRK	1694	SM3EVR	1340	KA5W	1050	KS0Z	715	K6UXO
2128	N6CW	1675	N5TV	1333	W4UW	1044	I0AOF	714	KC7EM
2123	I2PJA	1659	HA0DU	1329	W7CB	1031	YU7DR	697	N3KR
2077	YU1AB	1631	N6AW	1309	YU2TY	1016	W9IL	648	IK2BHX
2058	PA0SNG	1565	N6JM	1279	SM6CST	1000	NV9S	600	RB5MP
2047	W1NG								

SSB

3235	F9RM	1735	WA8YTM	1288	W4UW	1050	F6BVB	797	KC2FC
2964	I0ZV	1717	I8YZP	1272	W2NC	1042	I2EOW	790	K9BQL
2609	K2VV	1681	WF4V	1257	KK0L	1034	W0ULU	781	IK2DUU
2506	ZL3NS	1656	I4CSP	1251	KL7AF	1029	KA5W	771	KE6KT
2457	K6JG	1656	CT1LN	1249	EA8AKN	1020	I8WYD	766	I0PSB
2406	K2POA	1632	NJ0C	1239	CT4UW	1010	K8LJG	755	IT9ONV
2354	CT1UA	1569	EA2IA	1213	K5RPC	997	HA8XX	750	F1HWB
2268	K6XP	1538	ZP5JCY	1207	I1POR	972	WA2FKF	731	W5ILR
2238	I0AMU	1553	W1NG	1192	YU2NA	938	PY4OY	726	NE6I
2124	N4MM	1532	WA4QMQ	1186	PY4OD	912	KD9OT	713	IT9JKY
2120	I2PJA	1516	W3ARK	1178	SM6DHU	885	W6OUL	694	AI6Z
2095	W0YDB	1507	W9NUF	1178	CT1BY	877	KB0C	648	N6CGB
2064	VE1YX	1451	G4CHP	1156	AB9O	863	G4SDJ	647	DK0AF
2050	WD8MGQ	1450	G4CPJ	1155	N2CIC	859	KK5P	631	YV1CP
2007	I4ZSQ	1397	I2UIY	1152	I1EEW	857	CT1AHU	630	IK8GCS
2005	CT4NH	1393	AC2J	1144	IK5ACO	848	K3IXD	622	SM6CST
1915	N4NO	1387	XE1OX	1131	N6FX	825	LU1VK	618	CT1DIZ
1906	OZ53V	1350	N5TV	1129	N2AC	807	K8ZZU	611	HR1FC
1870	W4BQY	1305	I8KCI	1110	EA4KK	803	G4KHF	608	IK0EIM
1861	I8YRK	1305	EA3AQC	1100	PY4VX	800	I3ZSX	600	KB4HU
1801	PA0SNG	1303	KC8YM	1097	SM0AJU	799	NK2H	600	NM5Y
1750	W9DWQ								

CW

2688	W2NC	1762	I6SF	1224	N6FX	1011	AK9Z	753	I2EAY
2515	K2VV	1740	YU7SF	1220	K2POF	1010	KN7K	752	G4SSH
2356	WA2HZR	1729	LZ1XL	1151	SM6CST	1008	YU2CQ	743	NE6I
2347	N6JV	1709	EA2IA	1138	I2UIY	1005	TI4SU	715	W2XQ
2199	N4NO	1622	I1YRL	1125	SM6DHU	1004	VE1ACK	711	JA2GCW
2193	ON4QX	1613	N4MM	1117	I7PXV	975	KA5W	709	W0JIE
2051	K6JG	1595	4X4FU	1101	KL7AF	969	G4FAM	707	WB8ZRL
2029	W3ARK	1559	WA8YTM	1099	AK2H	967	SM5DAC	705	KA1CLV
2014	W9DWQ	1554	VO1AW	1090	W9PWM	948	LA9XG	670	K1BAZ/DV1
2004	VE7CNE	1519	PY4OD	1082	K8LJG	943	I8YRK	659	AC5K
1973	N6CW	1500	W9NUF	1077	W1WAI	920	AI6Z	651	G4UOL
1941	G2GM	1398	I2DMK	1038	SM0AJU	849	CT1LN	649	HA8XX
1927	K6XP	1365	KA7T	1034	I2IWM	849	G3VQO	639	KU0S
1926	W4BQY	1358	IT9VDQ	1026	F6HKD	821	KQ3S	622	LZ2VP
1851	N2AC	1350	N5TV	1023	DJ1YH	763	OE1KJW	609	IS0FIC
1779	OZ5EV	1292	W1NG	1018	W6OUL	760	OZ5UR	605	K7DBV

Guess what? After a few years of trying we got a bite.

Steve Dicks, W8YA, notes that age, like DX, is a relative thing. But though there has been a decade in between, Steve notes that he was on the Honor Roll in 1978 at the age of 31, though he doubts now that this would secure the title. But he points out that K5UR, Rich Roderick, down in Little Rock, is also on the Honor Roll, and he is currently in his mid-thirties, but that there must be someone even younger.

But we still have our hope that we will hear from a young member of the Honor Roll. A real young one—say, 28 or so. It is hard to believe that all there is in DXing these days are old geezers, even though at times one might suspect so. There has to be a young and yet unsung youngster out there. Tell us about it!

We will acknowledge that we have a couple more in the good years of being thirtyish, among them N4JJ, and some almost there while yet in their twenties. A couple in Tennessee, WB4CSK and WA4DPU, are promising that as soon as some expected and needed QSLs show, they will be among the anointed and Deserving.

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1616	KD3AI		

CW

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310	W6EUF/319	310	KZ2P/310
310	W4UG/319	310	W8IMZ/310
310	VE3MR/319	310	K2JLA/310
310	CT1FL/317	300	WB3DNA/309
310	W0SFU/317	300	WA2MID/307
310	KS2I/317	300	W0ULU/301
310	N7RO/317	300	SV8CS/300
310	W2SUA/317	275	K4LR/298
310	I8ACB/316	275	G3XTT/295
310	OZ5EV/316	275	WE2L/290
310	K1UO/315	275	W9SC/281
310	9H4G/312	150	EA2BUF/162

CW Endorsements

310	K4CEB/319	300	W6SN/303
310	SM6CST/317	275	W0HZ/295
310	DL8CM/314	275	IT9TQH/294
310	N4MM/313	275	G3XTT/280
310	YU1HA/312	200	K2JLA/230
310	SM3EVR/312		

Total number of active countries is 319. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

Remember, we would like to know how old you are now. Yesterday was good but a memory. We are still listening to hear the youngest (now) on the Honor Roll.

Andorra

There will be a group from Finland in Andorra for the *CQ* World-Wide SSB DX Test the end of this October. The call sign will be C30W.

Before the test, which marks the beginning of the new DX season, the group will be working the low bands on CW. The contest operation will be a multi-single effort. Pentti Lareva, OH3TY, sends along the information, and if no QSL route is given, try the route via his QTH.

WAZ

The recent Soviet/Canadian transpolar effort has brought some questions on WAZ credit. Unless the operation was actually on one of the islands it is not acceptable. On the icepack a contact would be considered a maritime mobile contact. If on one of the islands in the Arctic Ocean, then figure it very easily—in that WAZ zone. Should you need more definite information, check the WAZ rules; Rule 2 covers mobile stations not being acceptable.

Isle of Man

Steve Muster, G4UOL, will be on the Isle of man in November all primed for a lot of CW operation. Some months back Steve announced that he would be in Wales for the CW portion of the WPX Test. That was in May, and he was wondering aloud if Wales was really DX. He set out to find out if there would be any demand, and there was.

Being a high-speed CW operator, Steve stuck to that mode and made over 2000 QSOs

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using a makeshift antenna. The end-fed array was but 20 feet above the ground at the far end. Included in the totals were 71 JAs and 189 of the Deserving W/Ks. GW4UOL/A was the call sign, and 78 DXCC countries were worked.

Flushed with success and shouting, "Look out, Lloyd and Iris, I'm heading out again," Steve will be signing GD4UOL/A for 12 days in the last part of November and over the *CQ* WW CW DX Test on the last weekend of the month. Again, this will be a scientific DXpedition to determine whether the Isle of Man is really DX. The country has been on the DXCC Country List for half a century now, but the rumors persist. Steve intends to answer them once and for all.

Is this the end of Steve's research into the volatile values of DXing? Not at all. He is already making plans to test Guernsey in the coming year. Some may consider this micro-DXing, but it is a good possibility that his operation from Wales was a new country for some, almost a certainty for some JAs.

4FØJS—Malyj Vysotskij

This one showed early in July and was widely heralded as a new DXCC Country. The basis for the expectation was a letter written by Bob White, W1CW, back on November 17, 1970. At the time he was heading the ARRL DXCC desk. In answer to a query, Bob wrote, ". . . at such time as operation takes place . . . we will make an official announcement of its addition to our Countries List." In the intervening years the matter has been on hold, mostly because of lack of any success in getting authority to operate.

Actually, it does seem that the matter had long been forgotten in downtown Newington. Bob White has long been retired, and Don Search, W3AZD, has been handling the chores for a decade now.

Subsequent to the letter and a good many years after the 1970 date of writing, the ARRL Board of Directors ordered new DXCC procedures, these including that the DXAC review all proposed new DXCC countries. To follow the mandated procedures OH2BH was asked to supply (1) the information submitted in 1970 that provided the basis for that earlier decision, and (2) any supporting information that would indicate that the status of Malyj Vysotskij Island was unchanged from the 1970 decision.

It is noted that the recently adopted Country Criteria that was enacted early this year might raise some questions. Criteria Point No. 3 speaks pointedly of separation by an intervening country. However, 3(a) covers separation by continental land separation, and 3(b) to insular or island separation. There is thought that Malyj Vysotskij presents a possible hybrid case with both separation by land mass as well as the Soviet islands.

Also under consideration is the matter of a previously accepted country where there has been no operation, and how it will be handled when the first operation occurs after the criteria used in the early decision has been changed.

The use of the 4JØ prefix for a Finnish operation has been a matter of discussion, this being a prefix assigned to the USSR by the ITU. Inasmuch as the question of Finnish sovereignty is an important question in the country status determination, the Soviet call sign did raise a question, and on July 5th, when learning of the call to be used, the ARRL raised that point. OH2BN replied on behalf of OH2BH, stating:

This is the crew that put Howland Island up for DXers at the end of March/early April. Second from the left is Jean-Louise, TR8JLD, then the unmistakable Cliff, NO1Z. With the blue caps are Jim Smith, VK9NS, and XYL Kristi, VK9NL. The one on the far left is believed to be Ron, N9CLS, he being the only one without a label on his cap. QSLs for NØ1Z/KH1 go to Box 90, Norfolk Island.

". . . the [appropriate] authority in Finland is playing an extremely cautious role in its dealing with the USSR but will authorize our operation. . . .During his most recent visit to Moscow over the past weekend, your concern [over the call sign] was high on Martii's agenda. However, since 4J and 4K call signs are being used only for areas outside territorial USSR—with a USSR interest—e.g., in Antarctica and the Arctic, [we] see no reason to interpret the call sign as evidence of the sovereignty issue as such."

It was further added: "In the interpretation of the Finnish Telecommunications authorities, the OF-OJ call sign is reserved for use only within the Republic of Finland."

The matter was referred, as noted that the ARRL Board of Directors mandated that such questions be handled, and the answer may be with you now. It may still be under study when you read this. It might be noted that years back a country would not be considered for the DXCC Country List until there was an actual operation there. This has been modified so

Sometimes the question is asked as to what sort of cat writes a DX column. Here is EA1QF, Angel Padin Pazos, who writes the DX column for the Spanish edition of CQ. He is the one in the middle dressed in his working clothes. On the left is Juan Rosales, EA9IE, and on the right is Naama, SØRASD. EA1QF was hailed as Lynx of the Year at the Lynx Convention in Madrid

that a ruling can be obtained in advance, Peter I Island being an example.

Some DX Notes

Do you ever check the dates on your incoming QSL cards? For discussion's sake, what does 12/11/88 mean? Does it mean December 11 or does it mean November 12? The answer should be obvious, but sometimes it is not. Paolo Cortese, I2UIY, notes local practice might not be clear to others. He suggests writing it 12 November. Paolo has suffered with them all—transposed call letters, differing times due to local time differing from the usual time zone, even wrong number in his call sign. But all these are nothing to his working a needed country, asking for a CW contact after the SSB one, and then getting a single QSL with mode indicated as "SSB/CW." It really hurt.

Scotty Martin, W7SW, who recently was signing VK9YT, is enthusiastic about the facilities for DXing on Cocos-Keeling—an old school house with eight rooms, a 6-element beam on a 60 foot tower, and a 40 meter Delta Loop on a 75 foot tower. Along with VK9NKG, all 40 WAZ zones were worked and almost 200 DXCC countries. VK6YC is the one to contact if you think of Cocos-Keeling—Cres Thursby-Pelham, 107 Melvista Ave., Nedlands 6009, Western Australia.

The *CQ* WW DX Phone Test comes at the end of October, and if you are planning any type of DX effort, remember that it pays to advertise. Don't dare leave home without advising: *Inside DX* (436 No. Geneva St., Ithaca, NY 14850), *QRZ DX* (Box 832205, Richardson, TX 75083), *The DX Bulletin* (Box 50, Fulton, CA 95439), and *Long Skip* (Box 717 Station Q, Toronto, Ontario M4T 2N7). Also the W6TI broadcasts via W6RGG, 18655 Sheffield Rd., Castro Valley, CA 94549. And tell them early even if all the planning has not jelled.

The 1989 International DX Meeting is tentatively scheduled for April 22-24 again at the Holiday Inn in Visalia. SM3CXS has retired as SMØAGD's QSL Manager after handling over 200K QSLs. The cards from S9AGD were going into the mails in early July. The planned 4WØEA/Yemen effort ran into red-tape problems, and the initial dates were being pushed back—hopefully. Jim Smith, VK9NS, was in Central Kiribati the first part of July signing T31JS. WB2P is out early with the announcement he will be in the Caymans signing ZF2ML for the *CQ* WW SSB Test the last weekend in October. AI6V will also be out again signing P4ØV from Aruba in the test. *QRZ DX* reports that one of the monks on Mt. Athos holds the call sign SY2A.

The "Super DX Edge" is now available in a version that will operate on the IBM PCs, this including the XT and AT machines, and with IBM compatibles. The latest edition has advanced graphics and will give instant DX information on your computer. If interested, write to Tony Japha, N2UN, Xantek, Box 834, Madison Square Station, New York, NY 10159. Prepared with DX know-how, it can be a significant help. The program is also available for Commodore machines.

If you want more information on Pitcairn Island, Meralda Warren, VR6MW, currently a resident on the island, will supply a history of the island and its people in *A Guide To Pitcairn* for $5.00, which includes postage. Also available is a cookbook, *A Taste of Pitcairn,* also for $5.00 pp. Write to Meralda Warren, Pitcairn Island via New Zealand.

73, Cass, WA6AUD

QSL Information

HI8LC offers a free incoming QSL service for the Dominican Republic. Send your cards to: Luis P. Caamano, HI8LC, Box 88, Santo Domingo, Dominican Republic. Luis holds 5BWAZ and 5BDXCC.

Dave Espasandin, KZ8Y, does not handle 4S7AVR/8Q7AV QSLs. Dave does handle 4S7NMR, 8Q7AZ from 1984, N8DCJ/8P6, and 8P6G '83–84 only.

In the recent ARRL CW DX Test C31IU was active. That call was held by K9MW from 1975 to 1983, and Mike has left that area and is now in the Netherlands, last operating in 1983. W8JAQ has been getting QSLs for the recent activity on 160/80 and 40 meters. QSL route was given as W9FSS, a Silent Key since 1985. W8JAQ can handle C31IU QSLs only to 1983. Anything later must be suspect.

All of the following appears with a lot of input from W9LNQ, a watcher of the lonely night.

A22BW to DK3KD
AI5P/HBØ to W3HNK
C21RK to JJ1TZK
C3ØFLD to OH3RF
CXØXY to CX2CS
DK2SC/4S7 to DJ3FW
EXØAU to RA3AU
FO5HL to WB6GFJ
FO6AHV to N6CW
FP/KA1HY to K1RH
FT2XE to F6EYS
FV3ITU to FD1DBT
HBØ/DA1WA
HIØA to W2KF
JA1XGI/JD1 to JA Buro
K2BSA to W2RR
KC6TM to JA7AGO
N8DCJ/8P6 to KZ8Y
OHØMM to OH2MM
OX3GH to WA2TTI
RAØBB to RB5CB
SVØFG to KA6UUS
T2OAA to N4FJL
T31JS to VK9NS
TI2LTA to F6FNU
TX9IPA to F1DGS
VO7OF to WO1QF
VO7XX to VE Buro
VP2EMA to KV4AM
VR6ID to KB6ISL
WA4ZEJ/JW to WA4ZEL
WY5L/KH3 to N5DAS
YY5R to YV5EFP
3A2EE to F9RM
4N4AA to YU4SBH
4S7NR to KZ8Y
4KØDC to UA3AOC
8P6G ('83-84) to KZ8Y
8Q7AZ to KZ8Y
9V1XE to VK3DXI
A4XKP to Box 981, Muscat
GD4UOL/A to Steve Muster, 25 Norman Road, Ilford, Essex, IG1 2NH England
K4SXT/DU3 to NSD, Box 33, Code 200, FPO San Francisco 96651
LR1V to Radio Club Bariloche, Box 397, 8400 Bariloche (RN) Argentina
SMØAGD to Erik Sjolund, Ormbergsv 17, 19300 Sigtuna, Sweden
SV5TS to Box 251, CP 8100, Rhodes
YY5R to L. Rodolfo Ramirez J., Aptdo 4785, Caracas, ZP 1010A, Venezuela
4S7AVR to Noel Lokuge, 15/2 Balahenenmulla Lane, Colombo 6, Sri Lanka
8Q7AV to Noel Lokuge, 15/2 Balahenmulla Lane, Colombo 6, Sri Lanka

DX Ten Years Back

In October 1978 DXers were still waiting for Desecheo, the new one, to show, but delays kept popping up. A Serrana Bank operation was planned for January, but the Colvins were headed out for the far places, the Caribbean, the Middle east, or East Africa being on the flexible itinerary. The Frankford Radio Club was headed for San Andres for the *CQ* WW CW DX Test in November, and WB2CHO was headed for Sierra Leone to visit 9L1CA and operate in the *CQ* WW Phone Test. WB2CHO these days might be more easily recognized as VP2ML and the *DX Bulletin.*

The *CQ* WW DX Phone Test had operations lined up from South Sudan (ST0RK), from Navassa, St. Lucia, the Canary Islands, Kenya, Guernsey (GU5CIA), and 4U1UN was a new one still needed by some. The aforementioned Colvins were in Jamaica. ZLs were headed for Chatham.

LU3ZY was showing most evenings from the South Sandwich group, the Norwegians were talking Bouvet, and even Peter I Island was hoped for.

The Northern California DX Foundation shipped an FT-101 to Baghdad and was waiting to hear that the gear had been delivered. It had arrived, but the airline could not get anyone to take it off their hands.

How can you tell a DXer? Well, always they like to get together to eat and drink and tell of the glorious days of DXing that they know and the even better ones to come. And it is true whether they are DXers in Sao Paulo or Shanghai. Here is a regular meeting of the China Radio Assn., a dinner party, naturally. Everyone is smiling, even the two non-Locals in the background. DXers always enjoy the good times.

OH2BH and OH2BE were headed for the Madeira Islands for the WW DX Test, and the Clipperton DX Club was headed for St. Bartholemy Island to join the activity. Cycle 21 was still helping the Deserving. HB9ME had emerged into the daylight again after handling 19,298 QSLs for the 1978 Clipperton effort.

Slim was active. He was heard from Z5LL on Draeght Island. He also signed EI8H/GU, G3RCA/GU, and EI8H/HBØ. He was on from EG3PT in the Middle East and as PYØJN on Trinidade, pausing to sign EI8H/HV1CN and YI1GD from Iraq. The repititious use of the EI8H call eventually helped identify this Slim as a European amateur with a grudge against the holder of that call sign.

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REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

Special Report: FCC Reallocates the 220-222 MHz Segment

The fight to save all 5 MHz of the amateur 220 MHz band has been going on for nearly ten years now. The issue came to a head, however, when the FCC proposed reallocating the top 2 MHz (220–222) of the 220–225 MHz amateur band to business use on February 2, 1987. Prior to the 1979 World Administrative Radio Conference, the 220–225 MHz band was primarily allocated to the government Radiolocation Service, and amateurs were allowed access to the band on a secondary basis.

WARC-79 provided for the phasing out of radiolocation operation in this band, and 220–225 MHz became a prime candidate for reallocation. The FCC and NTIA (which gets involved in government frequency matters) said that they would allow the amateur service to use the 220–225 MHz band on a temporary basis until a decision could be made regarding permanent allocations. The handwriting was on the wall when a joint FCC/NTIA planning group recommended that a portion of the 216–225 MHz band be designated for narrowband land mobile operations on a shared basis between government and nongovernment users. The FCC received three petitions from industry requesting that these recommendations be implemented. Aided by skilled professional legislative lobbyists, the ARRL mounted a fierce campaign to retain the band for amateur use.

FCC Reallocates The 220 MHz Band

We were at the Thursday morning (August 4th) Commissioners meeting when the FCC ruled on the permanent frequency allocation of the 220 MHz VHF band. While the Amateur Service is naturally primarily concerned with the 220–225 MHz portion to which they have had long temporary access, the portion of the spectrum ruled on by the FCC extended from 216 to 225 MHz.

The bottom line is that the FCC followed through without deviation on their original proposal (NPRM, General Docket No. 87-14, February 2, 1987) and divided up the band three ways. The Commission:

1. maintained the Maritime Mobile allocation in the 216–220 MHz band;
2. allocated the 220–222 MHz band to the Private Land Mobile Service; and
3. allocated the 222–225 MHz band to the Amateur Radio Service for exclusive use.

The August 4th FCC Meeting

The matter was presented to the Commissioners by Julius Knapp, Chief of the Frequency Allocations Branch of the FCC's Office of Engineering and Technology. The following is the text of Knapp's presentation to the FCC.

"Good morning, Mr. Chairman and Commissioners. The item before you is a Report and Order bringing to resolution a very difficult and long standing allocation issue in the 220–225 MHz band. The 1979 WARC allocated this band internationally to Fixed, Mobile, Radiolocation and Amateur Services on a co-primary basis. The Radiolocation Service will become secondary on January 1, 1990, and no new stations may be authorized. The 220–225 MHz band had previously been allocated in the United States to the federal government on a primary basis for radiolocation and to the Amateur Service on a secondary basis.

"In 1984, the Commission conformed the United States allocation of this band to the international allocation. However, implementation of the fixed and mobile services was deferred until a further proceeding could be initiated to determine precisely how the band would be shared among the various services and between federal government and public users.

"The proposal in this proceeding was initiated to resolve these sharing issues. The proposal intended to balance a variety of factors. The Commission had received petitions seeking to implement narrowband land mobile systems in this region of the spectrum. Petitioners argued that existing provisions for narrowband land mobile systems are severely restricted due to the need to protect against interference to existing systems. The petitioners maintained that a dedicated band of frequencies was necessary for this technology to have a reasonable opportunity to gain acceptance in the marketplace.

"The National Telecommunications and Information Administration (NTIA) also stated that the federal government had requirements for narrowband land mobile systems in this band. At the same time, the Commission was concerned about minimizing the impact on amateurs. The proposal noted that amateur use of this band is considerably lower than other amateur bands, and that most such use was congregated above 222 MHz. Taking these factors into account, the Commission proposed to allocate the 220–222 MHz band for narrowband land mobile service, and the 222–225 [portion] exclusively to the Amateur Service. No allocation was proposed for the fixed service, because existing allocations elsewhere in the spectrum appeared adequate.

"In general, the land mobile community supported the proposal. For example, UPS [United Parcel Service] indicated that it will seek to develop a state-of-the-art [package] delivery system using narrowband equipment in the 220 MHz band. The land mobile community generally agreed that dedicated spectrum is required initially for this technology. On the other hand, amateurs strongly opposed the proposal. They raised a number of concerns including the impact on existing users, the impact on emergency communications, and the need to provide for future growth of the Amateur Service.

"Upon careful review of all of the information that has been submitted, the staff believes that the proposed allocations are in the public interest. It appears that there is ample space to reaccommodate current users of the 220–225 MHz segment in the 222–225 MHz segment. Further, numerous other amateur bands are available, and the loss of the 2 MHz represents less than a 2 percent reduction in amateur spectrum.

"With regard to emergency communications, several hundred channels will remain available in the most useful parts of the spectrum. This should meet the local area communication requirements of any emergency or natural disaster. The item seeks to assure the amateur community that the Commission continues to strongly support the Amateur Service. Amateurs have a long and out-

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standing record of service to the public, and have on countless occasions provided communications in emergencies.

"We are hopeful that by adopting an exclusive, private allocation of 3 MHz for the Amateur Service, we will remove the cloud that has hung over this band for many years. This should lead to increased use of the band by amateurs. This proceeding addresses only the allocation of the spectrum. Subsequent proceedings will address the necessary service rules for the new land mobile allocation, and modifications to the amateur rules. In light of these considerations, the staff recommends adoption of this Report and Order." *(end quote)*

FCC Commissioner James Quello: "It's a tough item. I've been a long time supporter of the Amateur Service. We recognize that they have an outstanding record. It's a well-disciplined service, and I hope that they have enough spectrum. I hope that we are allocating spectrum to a service and not to a technology. Do you have any comments on that?"

FCC Chief Engineer Tom Stanley: "The 220–220 MHz band is being allocated to the Private Land Mobile Radio Services in Part 90. Narrowband technology is to be applied, but the allocation is to a service and not to a technology."

FCC Chairman Dennis Patrick: "I agree with Commissioner Quello that this is a tough item, a difficult decision in many ways. We've studied the various arguments and concerns that were expressed on both sides of the question for quite a number of months. I take some solace in the fact that the amateur community has been on notice for quite some time of the possibility of the reallocation of this spectrum. The amateur community will now have exclusive use of the 3 MHz here that is being divided, and this represents less than 2 percent of the spectrum available to amateurs.

"All that being said, it's still a tough decision, . . . as spectrum allocation decisions always are. The amateurs continue to provide very valuable services to the American people in emergency situations, and with respect to training radio operators. But we also have continuing critical and pressing needs in the land mobile area, and we want to promote spectral efficiency. We make some strides forward in that regard in this decision. So, all in all, I'm confident that this is the correct decision, . . . though not an easy decision."

After Meeting Press Conference

A press conference was held after the Commissioner's meeting and a press release issued. The Commission said a variety of factors were considered in making the allocations, including the need to provide for narrowband land mobile operations, the impact on amateur use of the 220–225 MHz band, and the potential interference to TV broadcasting, . . . as well as the actions taken in the 1979 World Administrative Radio Conference (WARC). It was also pointed out that as a result of the 1979 WARC, amateurs received several new frequency allocations.

The FCC said they felt "the public interest would be best served by providing dedicated spectrum for the development of narrowband spectrum efficient land mobile technologies, if such technologies are to have a reasonable opportunity for acceptance in the market place. As compared to conventional land mobile technology, narrowband technology may provide a three- to four-fold increase in the number of channels that can be made available in the given amount of spectrum." The Commission noted that "promoting narrowband technology for the Land Mobile Service is consistent with the directive of the Communications Act to encourage the provision of new technologies and services to the public.

In considering an allocation for narrowband Land Mobile Service in the 220 MHz region, the Commission noted two constraints that precluded operation in the 216–220 MHz band. "The first constraint is that land mobile operation in the 216–220 MHz band would be impractical due to the need to provide adequate protection to TV channel 13 broadcast oper-

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ation located in adjacent spectrum at 210–216 MHz. The second is the Commission's decision not to restrain the development of Automated Maritime Telecommunications Systems (AMTS) being developed in the Maritime Mobile Service in the 216–220 MHz band. Consequently, after careful consideration of a variety of alternatives, the Commission found that reallocation of this band to the Land Mobile Service to be shared by government and non-government users is supported by the NTIA.

With respect to amateurs, the Commission believes that, "they will benefit from an exclusive allocation of the 222–225 MHz band." The Commission noted that "several other frequency bands are available for amateur service. In particular, amateur bands at 28–29.7 MHz, 50–54 MHz, 144–148 MHz, 222–225 MHz, 420–450 MHz, 902–928 MHz and 1240–1300 MHz support amateur operations similar to the 220–222 MHz band."

"Several hundred channels will remain available for amateurs to use for emergency communications, which should meet the local area communication requirements of any emergency or natural disaster." Taking these factors, along with others, into consideration, the Commission found reallocation of the 220–222 MHz band to be in the public interest.

The Commission reiterated its continued support for the Amateur Service. The FCC said it recognizes that "amateurs have a long history of public service and of providing assistance in emergencies, including national and international disasters. Further, amateurs are a vital resource of persons knowledgeable in the radio art and have had a long history of contributions to the advance of radio science. The 3 MHz allocated to amateurs on an exclusive basis in this proceeding, together with the many other amateur bands, should continue to provide adequately for this service."

The FCC said that amateur use of the 220–225 MHz band could continue pending "a new proceeding [that] would be initiated to develop procedural and technical rules for licensing Private Land Mobile operations in the 220–222 MHz band."

"However, since the 220–222 MHz band is to be shared between government and non-government users, the development of coordination procedures is needed," the Commission stated. "Consequently, neither government nor non-government users will be allowed access to the 220–225 MHz band until the Commission has adopted final service rules.

No effective date for amateur operation to end in the 220–222 segment has been decided on, but January 1, 1990 appears logical since it was the date mentioned in the NPRM. "Amateurs are advised to begin an orderly transition of ongoing operations in the 220–222 MHz band to other amateur service frequency bands in order to avoid an abrupt termination of such activities."

Questions Asked of FCC Chief Engineer Tom Stanley

W5YI Report: "When Commissioner Quello asked about allocating spectrum not to a technology but to a service, what did he have in mind?"

Stanley: "People have asked in the past, 'Well, you're just allocating this spectrum to ACSB (amplitude compandored sideband), aren't you?' The answer is no. We are allocating to Part 90 *Land Mobile* services. ACSB is one narrowband technology but certainly not the only one."

W5YI Report: "The FCC appears to have considered the 220–222 portion of the band to be under-utilized by amateurs. Now that all the comments have been reeived and the study has been done, is the Commission still sticking to its feeling that it was under-utilized?"

Stanley: "Correct. Use is a relative thing, and light use is even more relative. We still feel that the band is lightly used, and that the current users of that band can be accommodated in the 3 MHz above 222."

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and auxiliary stations now operating in the lower part of 220 to other amateur bands, the rules would have to be hanged. Will further proceedings address this issue?"

Stanley: "I presume that whatever is needed, more work would have to be done to identify whatever changes would be required. I don't know that the amaeur rules specifically would be up for change, but I presume so."

Response By The ARRL

The American Radio Relay League, who had led the fight to keep the 220–225 MHz band intact for the Amateur Radio Service, was most unhappy with the FCC decision to reallocate 220–222 to the Private Land Mobile Service. The ARRL, who vowed to continue to fight on, issued the following press release at noon on August 4th. Apparently they anticipated the result and had it all set to go.

"In the face of overwhelming public opposition, the Federal Communications Commission today adopted its own proposal to reallocate the 220–222 MHz frequency band from the Amateur Service to private land mobile use.

"The reallocation, proposed by the FCC 18 months ago to address what it said were critical land mobile needs and a desire to promote spectrum-efficient technology, attracted strong criticism from the nation's 435,000 radio amateurs and the many public-safety and disaster-relief organizations who rely on amateurs in communications emergencies. The thoughtful protests of many thousands of citizens became a part of the official record of the proceeding. Dozens of Congressmen expressed their own opposition to the Commission, as did the Department of Defense, on its own behalf and that of the National Communications System.

"Yet it was not until United Parcel Service filed comments, six months late, that a significant user of the proposed new land mobile band went on record as desiring the reallocation. Despite the clear testimony that the original proposal was not in the public interest, the Commission's action appears to be identical to its first proposal without reflecting any additional understanding of Amateur Service needs. In its presentation of the item for Commission consideration, the staff of the FCC Office of Engineering and Technology stated that the reallocation represented just 2 percent of the presently available amateur spectrum, a figure that was echoed by Chairman Dennis Patrick.

"We're shocked and disappointed at the Commission's action," said Larry Price, President of the American Radio Relay League, the primary spokesman for amateur radio in the United States. "The 2 percent figure has no basis in fact. As we've pointed out throughout the proceeding, the 2 MHz the Commission is intent on taking away from the Amateur Service represents more than 15 percent of our international primary allocations between 30 and 24,000 MHz.

"FCC tried to soften the blow by saying that the remaining 3 MHz would be available to amateurs on an exclusive basis, and by expressing its continued strong support for the Amateur Service. 'It's nice that the Commissioners want to be seen as supporters of amateur radio, but actions speak louder than words,' observed ARRL Executive Vice President David Sumner [K1ZZ]. The notion that existing amateur operations below 222 MHz can all be reaccommodated in the remaining 3 MHz is fanciful, and not supported by the public record. On the other hand, the spectrum efficiency of narrowband land mobile technology has been seriously challenged in engineering circles and may in fact be illusory. About all that can be said for the Commission's action is that it provides a fertile field for arguments in support of reconsideration or reversal."

"We've lost a battle, but not the war," ARRL President Price commented. "The League will continue to pursue every available administrative, judicial, and legislative remedy to ensure that radio amateurs have access to the spectrum they need to serve the public."

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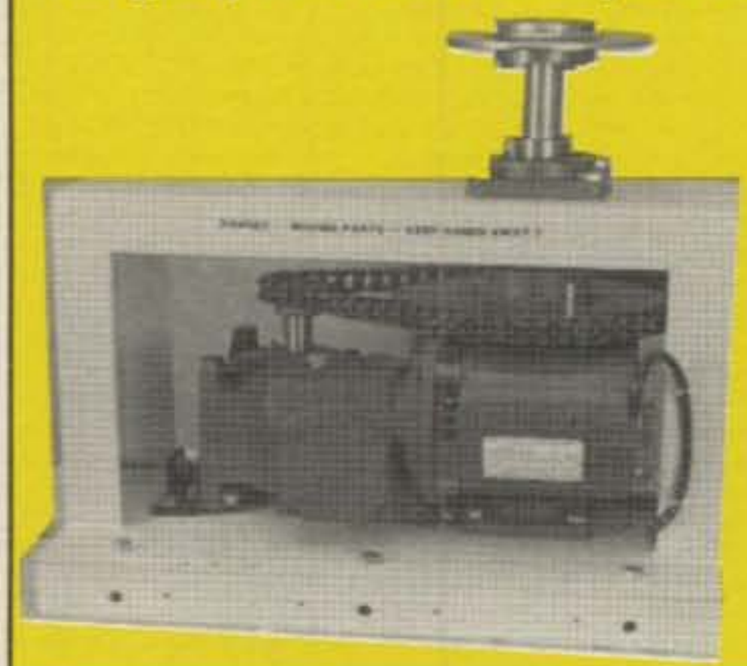

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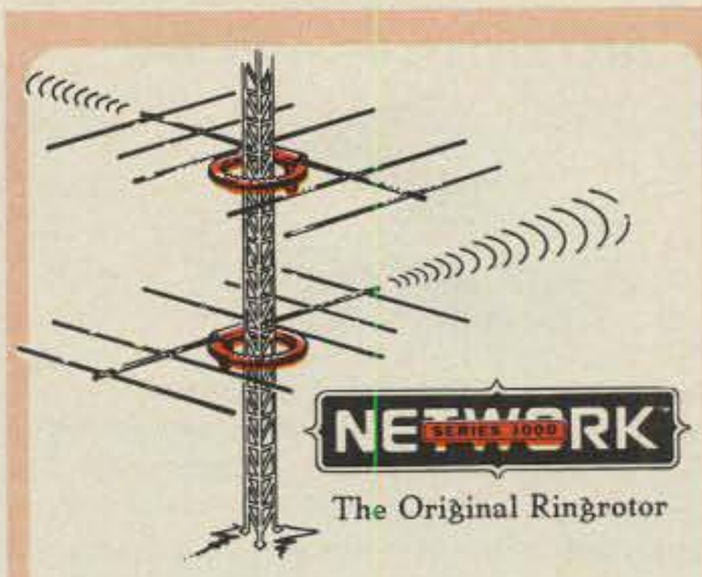

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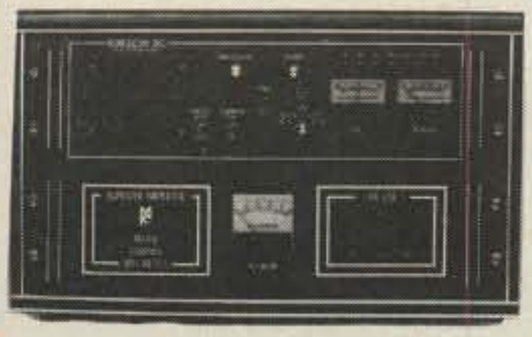

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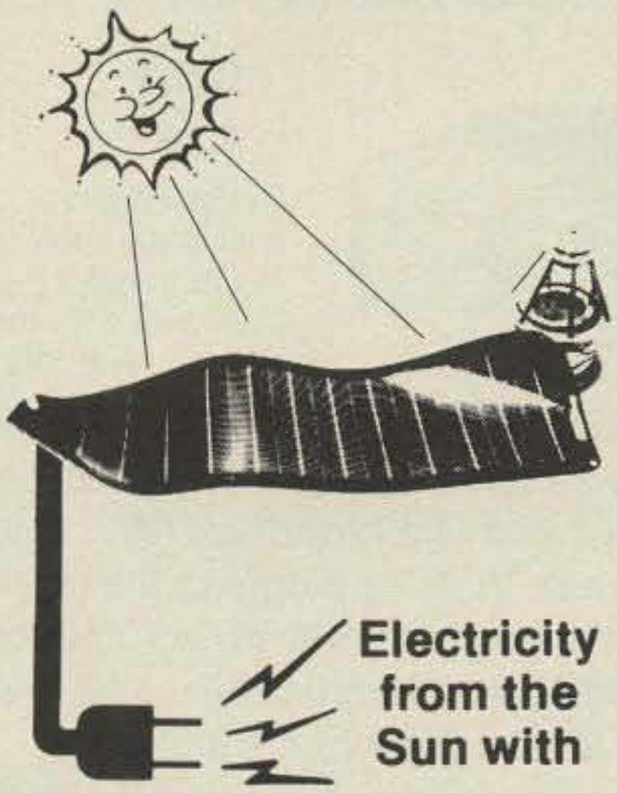

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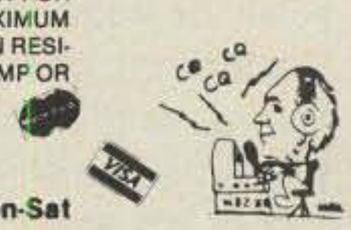

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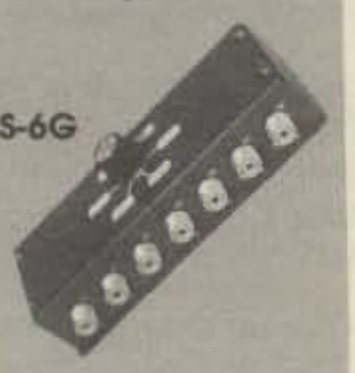

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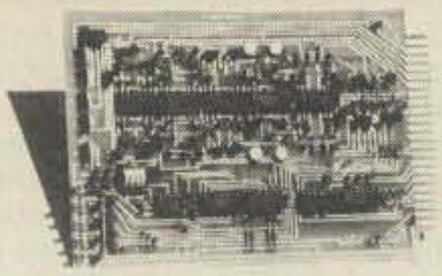

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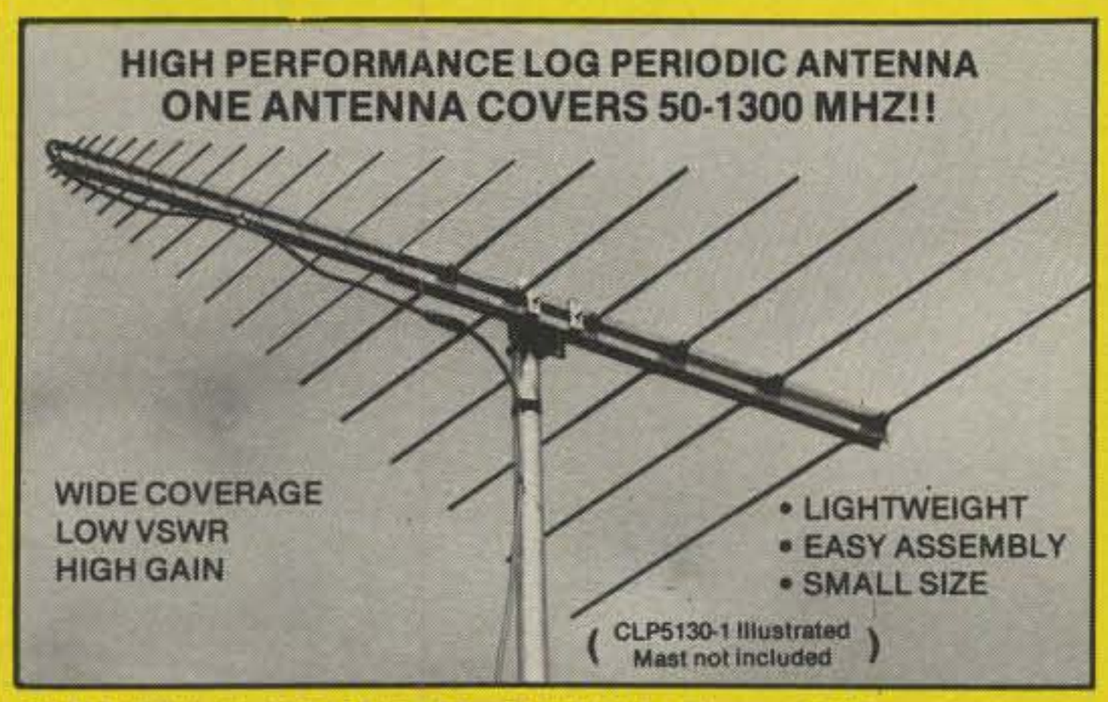

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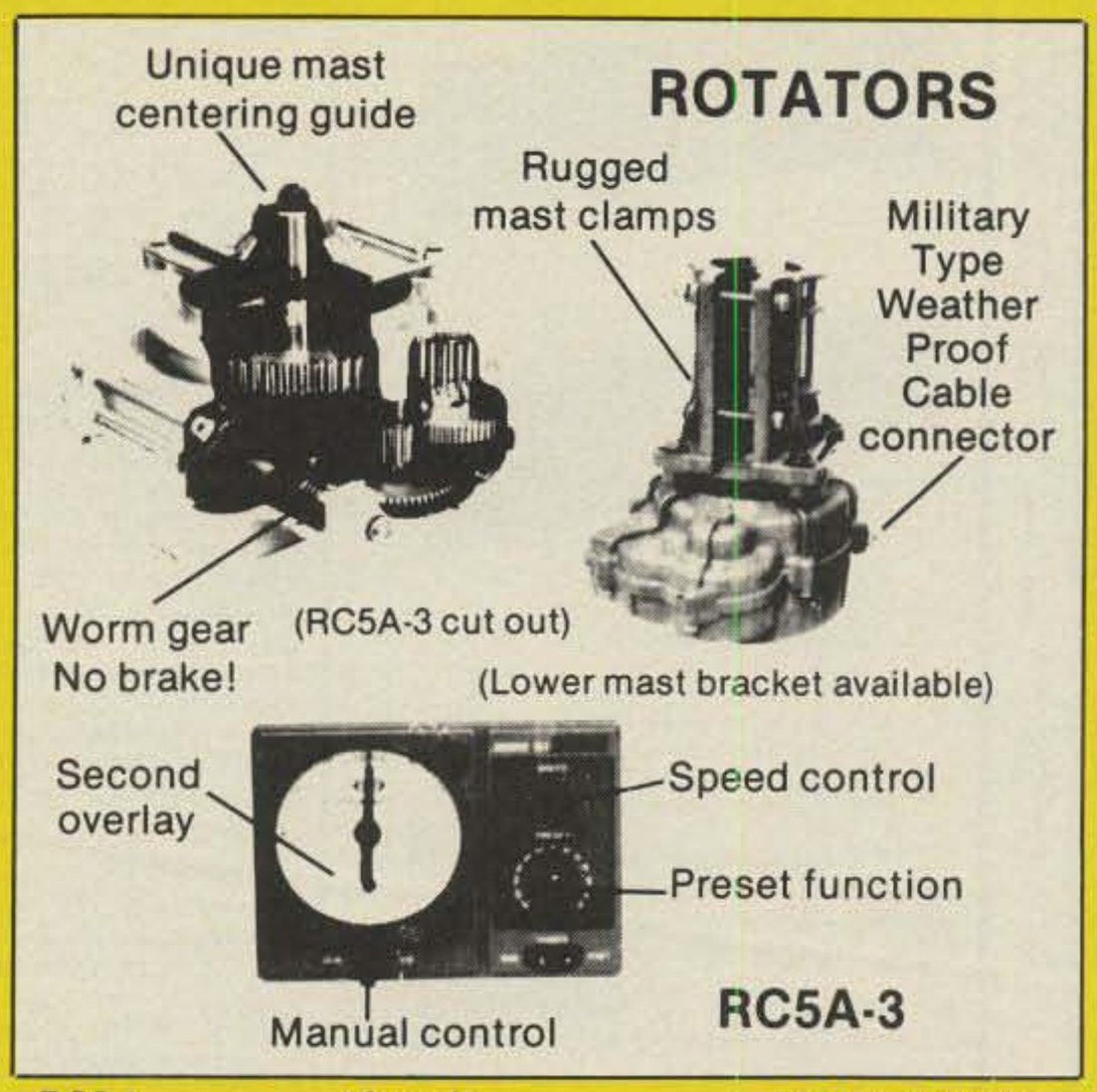

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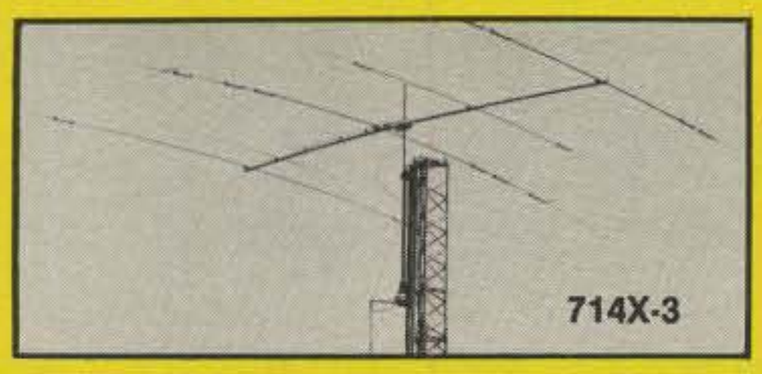

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(Prices include balun)

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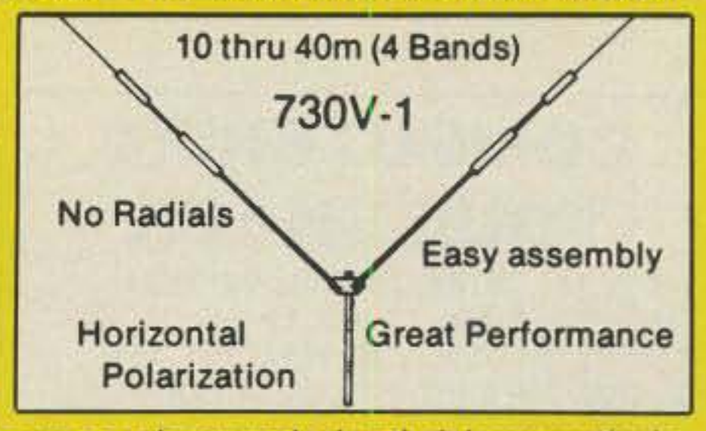

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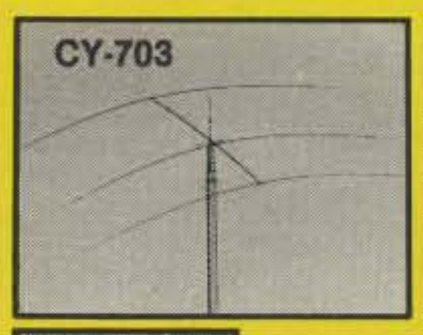

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CL10DX	28.00	6	30′6″	18′½″	16′1″	33	2 kw	$310.
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CL15DX	21.00	6	40′8″	24′3″	24′3″	58	3 kw	$205.
CL20	14.00	4	30′9″	36′8″	36′8″	58	3 kw	$495.

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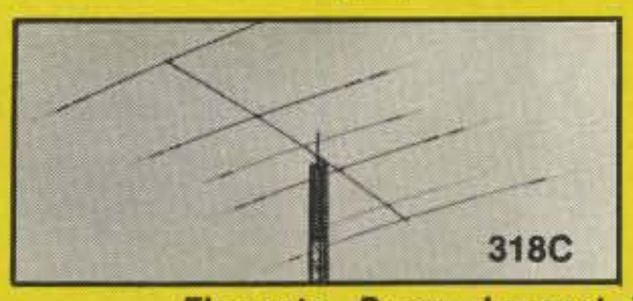

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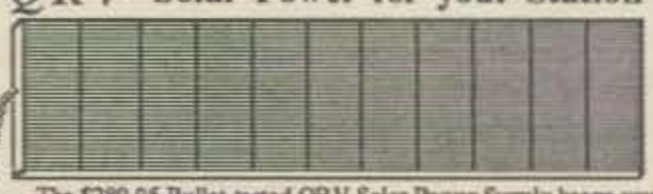

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